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Jochen Späth
Tobias Brändle
Stefan Preuss
Marcel Reiner

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Operationalizing Seasonal Work in Germany*

Jochen Späth**   Tobias Brändle   Stefan Preuss   Marcel Reiner

Institute for Applied Economic Research (IAW), Tübingen

Abstract

Due to a lack of sector-overarching, frequent and representative data, only little is known about the prevalence of seasonal workers in the German labor market and, in particular, about their working conditions such as forms of employment, working hours or even wages. We estimate seasonal work in Germany using a custom, representative sample of the Employment History (BeH) of the Federal Employment Agency (BA) that encompasses information on short-term employees that are new to scientific research. We achieve a reasonable fit to the – less frequent and sectorally restricted – Farm Structure Survey by the German Federal Statistical Office suggesting our method for future analyses of seasonal work. Our analyses reveal large differences between economic sectors, the share of seasonal work being highest in agriculture and forestry, followed by hotels and restaurants. While in agriculture and forestry the vast majority of seasonal workers is given by short-term employment, in the hotel and restaurant industry marginally paid (part-time) employment is the dominant type. Since 2012, the number of seasonal workers has increased in all investigated economic sectors. That said, there are hardly any signs of significant spikes since the introduction of the general minimum wage in 2015.

1   Introduction

Although seasonal work is deemed relatively important in certain parts of the German economy, little is known about the number and development of seasonal workers in Germany. The observations of the few available scientific literature usually relate to the period before the year 2010/11. If newer data is available, it can only be continued beyond this date with limited comparability due to the comprehensive freedom of movement for workers came into force for the EU-8 states, which made up for the majority of seasonal workers in Germany to that point (compare, for example, Wagner and Hassel 2015).[1] In view of the insufficient data situation on the prevalence and development, it is hardly surprising that the structure of seasonal workers in Germany, their wages, working hours and other working conditions are almost completely unknown. Furthermore, nothing is known on the effects of the introduction of the German federal minimum wage in 2015 on seasonal workers, a group which might be affected strongly due to their low-skill and low-pay characteristics.

The scarce knowledge about the situation of seasonal workers in Germany and the lack of data thereon thus make it necessary to gain a new empirical data basis for seasonal work, which can be used to engage in further statistical analyses. The major concern of the present expertise is operationalization of seasonal work and its descriptive analysis in three economic branches where seasonal workers are most important. The analyses are based on a representative sample of individual data from the Federal Employment Agency (*Bundesagentur für Arbeit, BA*), which provides information on the employment relationships at the personal level reported in the respective sectors. In contrast to elaborate (and expensive) survey approaches, these data are already generated in the course of BA's administrative processes and do not need to be collected separately.

The aim of this paper is to review and supplement the current state of research on seasonal work in Germany. The focus will be on the number of seasonal workers, their socio-demographic structure and temporal development. Changes in the structure of seasonal work will receive special attention in the light of the recently introduced minimum wage. Three industries, which are characterized by a traditionally high importance of seasonal work, will be taken into consideration: agriculture, forestry and fishing; hotels and restaurants; as well as gardening and landscaping.

This paper is structured as follows: After a review of the few existing literature in the field of seasonal work (Section 2), the data used in the project are first presented in Section 3 and second discussed with regard to their suitability for the operationalization of seasonal work. Following a description of the procedure for the operationalization of seasonal work, we compare our approximation of seasonal work with the Farm Structure Survey of the Federal Statistical Office *(Agrarstrukturerhebung, ASE)* in order to better classify the results. As a result, Section 4 contains descriptive findings on the number of seasonal workers in Germany and their socio-demographic structure based on their operationalization in the project dataset. This includes, in particular, a simple descriptive comparison of the number of seasonal workers before and after the introduction of the respective statutory or collectively agreed minimum wages. Section 5 summarizes the main findings and recommendations for further research.

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[1] Those countries are Estonia, Latvia, Lithuania, Poland, Slovak Republic, Slovenia, Czech Republic and Hungary. Since then, (seasonal) workers from these states no longer need to obtain a seasonal work permit to work in Germany and can therefore not be tracked anymore by official data sources.

2   Related Literature

There are various definitions of seasonal work by international organizations such as the OECD, the European Parliament, Eurostat, or Eurofound, all of which refer back to three characteristics: (1) time limitation, (2) seasonality of workload and – in the case of foreigners – (3) persons with a country of residence other than the country where the employment takes place (for an overview see López-Sala et al., 2016). These definitions, however, take place at a relatively abstract level and do not give an indication of a concrete empirical operationalization of seasonal work.

In Germany, relatively little is known about the prevalence and development of seasonal work today, one reason being the imprecise definition of seasonal work detailed above. Another reason is the lack of data in which seasonal workers can be identified. The observations of the few existing scientific literature, which approaches the topic by means of the analysis of quantitative secondary data, end or lose their comparability over time in the year 2010/11 (cf. Wagner and Hassel 2015). As a result, the number of (recorded) seasonal work permits (including showman assistants) sharply drops from around 300,000 in 2010 to merely about 200,000 in 2011 and 4,000 in 2012.[2] In addition, there are isolated studies that investigate the phenomenon of seasonal work by using own standardized or qualitative surveys of farms and/or seasonal workers (Venema/Grimm 2002, Müller et al. 2013). However, these are mostly limited to a certain regional or sector and thus, not only because of small random samples, cannot provide representative results for Germany. The majority of seasonal workers, at least as recorded in the data on seasonal work permits prior to 2011, is situated in agriculture, forestry and fishing. Therefore, the Farm Structure Survey (*Agrarstrukturerhebung, ASE*) of the Federal Statistical Office is often used to analyse the prevalence and development of seasonal work in Germany (see also Fasterding and Rixen, 2005).

Little is known about the current working conditions of seasonal workers since the available studies were usually carried out in the early 2000s. According to Dietz (2004), which refers to the number of seasonal work permits, around 90 % of the seasonal agricultural workers come from Eastern Europe, mostly from Poland. However, these figures refer to the year 2002 and are therefore not up to date. From the representative study of Venema and Grimm (2002) it is known that about 50 % of Polish seasonal workers (in all sectors) in Germany are less than 35 years old. However, their sample consisting of 202 Polish seasonal workers is relatively small. Venema and Grimm determine that the gross hourly wage of Polish seasonal workers in Germany at that time was 12.44 DM on average. At a mean working time of more than 50 hours per week at that time, the average net income was about 2,083 DM.[3]

Given that seasonal workers are mainly young, low-skill and low-paid, the introduction of the German federal minimum wage in 2015 should have had a large impact. However, due to the limited knowledge

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[2] Please note that the number of seasonal work permits is not exactly the same as the number of seasonal workers, as, on the one hand, several seasonal work permits per person could be issued within one year and, on the other, it is not guaranteed that people will receive their seasonal work permits actually started working in Germany.

[3] According to Booth et al. (2002, 2000), seasonal workers in the United Kingdom received lower wages compared to permanent and fixed-term workers. Galarneau (2010) came to the same conclusion for Canada. In contrast, Del Bono and Weber (2008) found higher salaries of seasonal workers in Austria compared to non-seasonal workers. They interpret this result as compensation for the anti-targeted unemployment of seasonal workers (= compensating wage differential).

of seasonal workers in Germany since 2011, it is hardly surprising that analyses of the effects of the introduction of the minimum wage on seasonal workers in Germany are non-existent. There is some evidence on the effects of industry-specific minimum wages on the phenomenon of international employee secondment in the construction sector (Meier and Munz 2008), but this can not be generalised to the effects of a general minimum wage on seasonal work.

In the three sectors where most seasonal workers are said to be employed - agriculture and forestry, hotels and restaurants, and gardening and landscaping- there are some studies which discuss the impact of the minimum wage on different (economic) outcomes, such as employment and wages. Among them are Garming (2016) for agriculture and horticulture, as well as Buer and Drescher (2015) and Straub (2015) for hotels and restaurants. According to Garming's (2016) survey, managers expected seasonal workers' salaries would rise by about 11% between 2014 and 2015. Buer and Drescher (2015) find that managers expected additional costs of around 2-3% of sales volumes due to the introduction of the federal minimum wage. Straub's (2015) survey suggests that the additional costs associated with the introduction of minimum wage are offset by price transfers, although the scope for further price increases seems to be limited. However, all of these studies are based on small surveys, which also face limitations regarding possible self-selection. They serve as descriptive evaluations for the potential relationship between minimum wage and seasonal work, but not as a general assessment of the economic effects of the federal minimum wage on seasonal work in Germany.

The low level of knowledge about the situation, especially in the most affected sectors, in Germany, as well as the discontinuation of the database recording seasonal work permits make it necessary to aim for a new empirical operationalization of seasonal work that can be used to create further analyses and that ideally also includes domestic seasonal workers and allows for comparisons across time.

3   Operationalizing Seasonal Work with Data of the Federal Employment Agency

Since there is no comprehensive data source for Germany that provides information on seasonal workers on a cross-sectoral, annual and reliable basis, we use data from the Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung, IAB) at the Federal Employment Agency (Bundesagentur für Arbeit, BA) to operationalize seasonal employment. We focus on the aforementioned sectors of agriculture, forestry and fishing; the hotel and restaurant industry; as well as gardening and landscaping. Wherever possible, we evaluate our findings with respect to existing knowledge about seasonal work, for example from the Farm Structure Survey of the Federal Statistical Office.

3.1   Data

The basis of the following assessment of seasonal work is a representative sample from the Employee History (Beschäftigtenhistorik, BeH) of the IAB. In addition to the information usually available in this dataset, we also have access to micro-data on short-term employment which have not yet been used in scientific research so far. This type of employment is usually cleansed before making the data available to scientific researchers.

The BeH contains administrative data at the person level, which are based on the social security contributions each firm has to report to the Federal Employment Agency. They include information on all employees subject to social security contributions and, since April 1, 1999, also on all marginally employed employees.[4] The records are measured on a daily basis and also contain both socio-demographic information on the employee (date of birth, gender, education, nationality etc.) and information about the employment relationship (daily gross pay, part-time/full-time, position in employment etc.). Due to the mandatory nature of the employers' social security notifications, the correctness of which also has an impact on the calculation of employers' and employees' social security contributions, a high degree of accuracy can be expected.

Information on short-term employment, which, given the temporary nature of seasonal work, is of particular importance in the identification of seasonal work, is usually not included in the BeH. Short-term employment relationships with a duration of currently up to 70 days per calendar year are reported in Germany by employers via the federal agency Minijobzentrale.[5] The notification procedure is identical to that for employees subject to social security contributions and marginally employed employees, whose statements can be found later in the BeH. However, during the processing of employer notifications, the information on short-term employees is usually removed from the data, since fewer variables are available and the information they provide is believed to be of lower quality than other employment spells. For example, there is no information on the remuneration of short-term employees, as this is, unlike for marginally paid (part-time) employees[6] or employees subject to social security contributions, not mandatory in the employer notifications.

Since the individual data on short-term employees stem from the same reporting procedure as other types of employment in the BeH, they can be merged. Following this merge, a comprehensive, day-specific data set is produced, which includes employees who are subject to social security contributions, marginally paid employees and short-term employees alike. Since the data include information on the firms in which employees work, the economic sectors and further firm-specific variables can be identified. Access to data was given via a custom sample to ensure the specific sampling criteria needed for the following analyses were met. In addition, more particularly up-to-date information, i.e. until 2016, could be made available in this way.

3.2   Sampling Procedure

We construct a custom sample of the BeH, which includes short-term employment spells and which follows a disproportionately stratified random sampling procedure in order to obtain sufficient observations for the following analyses, while at the same time being thrifty on the size of the data due to data privacy protection legislation. The sampling strata are industry affiliation (agriculture and forestry[7], hotel and restaurant industry[8], gardening and landscaping[9]), form of employment (subject

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[4] Civil servants and self-employed are generally not included in the data, assisting family members only as far as they are legally employed.

[5] As of January 1st 2015, the tariff autonomy law introduced on August 16th, 2014, extended the duration of employment for short-term employment from two to three months in accordance with § 115 SGB IV.

[6] The terms marginally paid employees and marginally paid part-time employees are used as synonyms throughout this paper.

[7] Classification of economic activities 2008, point A (agriculture, forestry and fishing).

[8] Classification of economic activities 2008, point I (accommodation and food services activities).

[9] Classification of economic activities 2008, point 81.3 (landscape service activities).

to social security contributions, marginally paid and short-term employed), federal state (Bundesländer), and calendar month and year (2012-2016). The sampling took place within the months of each calendar year in order to be able to map fluctuations in employment over the course of the year, which is a mandatory prerequisite for the identification of seasonal work. In addition, the sampling procedure took care of all further employment episodes of the persons inside and outside the economic sectors investigated in order to be able to map multiple employment.

All in all, after data preparation and cleansing,[10] our sample consists of the following number of observations, based on information on employees, which have their main or side job in one of the three sectors under investigation (see Table 1). A benchmark against official statistics[11] published by the BA shows no major differences between the two data sources.

Table 1: Sampled Employees by Type of Employment and Economic Sector, June 2016

	Agriculture and Forestry	Hotel and Restaurant Services	Gardening and Landscaping
ESS	9,034	9,516	10,026
MPTE	7,395	7,176	6,508
of which eMPTE	*5,038*	*5,056*	*4,640*
STME	2,365	2,104	1,028
of which eSTME	*2,178*	*1,482*	*847*

Note: ESS: Employees subject to social security contributions. (e)MPTE: (exclusively) marginally paid (part-time) employees. (e)STME: (exclusively) short-term marginal employees.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

3.3   Identifying Seasonal Work on the Basis of the Federal Agency for Employment

One of the challenges of identifying seasonal workers is that a corresponding characteristic of "seasonal work" is not included in the data, meaning that seasonal workers can only be approximately identified. Seasonal work is defined by the following central features: the duration of the employment relationship is fixed and workload is seasonal (see Section 2.1). Seasonal work is an employment form whose primary objective is to cover peaks of workload that occur year after year in approximately the same season, by additional staff who are not part of the core workforce and who do not continue to work after the "season" ends. In the following, seasonal work is thus approximated by a) defining a time period marking the "season", and b) defining characteristics of the form of employment likely to

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[10] The essential steps in data preparation involved pooling the data on the individual forms of employment; the adjustment of short-term employment data by redundant and implausibly short messages of only one working day; splitting the partially overlapping employment episodes into episodes that no longer or only completely overlap. Here, episodes for socially insured, marginally paid and short-term employment were subjected to a joint splitting. We use the imputation of educational variables according to method IP1 of Fitzenberger et al. (2006), to prepare educational variables at the person level in a timely consistent manner and to reduce the proportion of missing values, and transform employment spells into in cross-sectional data at the end of each month during the observation period.

[11] The estimation was based on the design weights from the stratified random sampling.

be associated with seasonal work, specifically: fixed-term contracts (FTCs), marginally paid employment and short-term employment.[12]

The starting point for identifying seasonal workers is the determination of a time period describing the location and duration of the "season". To that aim, we determine the month with the highest employment level separately for each of the three economic sectors investigated as well as for each federal state[13] (see Table 4 in the Appendix). Calculations are based on monthly averages for the years 2007-2015 in order to rule out year-specific effects. Around this "peak month" we place a seasonal window with a duration of seven months. The period of seven months was determined on the basis of two considerations. First, it is based on calculations by the BA, which publishes unadjusted and seasonally adjusted figures for the number of employees subject to social security contributions in agriculture and forestry as well as hotels and restaurants. Based on these published values, the seasonal component can be calculated. This procedure indicates a 7-months seasonal window. Second, a symmetrical definition of the seasonal window around the peak month seems practical.[14]

Based on our operationalization of the seasonal window, employment relationships were classified as seasonal work if they are (1) within the seasonal window and either (2a) fixed-term contracts, subject to social security contributions and do not exceed 7 months, or (2b) marginally paid and do not exceed 7 months or (2c) reported as short-term employment. In doing so, individuals can qualify as seasonal workers both through their main activity and side jobs, if existent. As seasonal work is by definition a temporary job, workers subject to social security contributions with a permanent contract were deliberately not classified as seasonal workers. This also ensures that permanent contracts that end in the probationary period, i. e. within six months from their beginning, are not defined as seasonal work. Yet, it is not possible to distinguish between seasonal work and FTCs subject to social security contributions that end in the probationary period. Seasonal workers from abroad who are posted to Germany or ordinarily engaged in activities in several EU member states are as a general rule not notifiable in Germany and thus are absent from the seasonal labor force figures shown here. How big this error is, however, cannot be quantified due to a lack of suitable data.[15]

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[12] Marginally paid employment (also known as mini-jobs) is essentially a kind of part-time work with very low working hours and only limited contributions to the social security system. The wage of a marginally paid employee must currently not exceed 450 Euros a month. Short-term work, on the other hand, restricts employment to currently 70 working days (by the end of 2014: 50 days) per year. One of the main differences to other types of flexible employment, such as temporary agency workers, is the seasonality of the workload. Specifically, temporary agency workers are employed throughout the year in different firms which have peaks in their order books, typically in sectors which are not affected by the seasons of the year.

[13] For reasons of data protection, the following federal states had to be combined in sampling: Schleswig-Holstein and Hamburg, Lower Saxony and Bremen, Rhineland-Palatinate and Saarland, Berlin and Brandenburg. As a result, instead of 16 federal states only 12 partially combined federal states can be expelled.

[14] See Figure 20 in the appendix for details on the derivation of the seasonal windows.

[15] The German Federal Statutory Pension Insurance Scheme (Deutsche Rentenversicherung Bund) as well as the Central Customs Authority (Generaldirektion Zoll) provide further data on posted workers based on the number of A1 portable documents issued. However, posted seasonal workers cannot be singled out from ordinary posted workers, and the number of A1 portable documents issued need not coincide with the number of posted workers, inter alia. The data from the Central Customs Authority additionally lack temporal consistency and, besides, come without any industry classifier and are thus only suitable to very highly aggregated analyses.

3.4 Validation against the Farm Structure Survey

The only other reliable source for identifying seasonal work in Germany is the ASE of the Federal Statistical Office, which collects figures corresponding to ours for the agricultural sector. The ASE is carried out every three years, the most recent years being 2013 and 2016 as a mandatory company survey. All agricultural and forestry holdings are surveyed above certain detection limits. In 2016, the ASE was conducted as a combination of a condensed general survey and a detailed sample survey of around 80,000 farms. The aim of the ASE is to collect data on the structure of agriculture and forestry, for example the number of farms, the area used by type of use and the employment structure.

The ASE differentiates between permanent and seasonal workers as well as family workers, employees and shareholders of civil law companies are also included. Employees aged 15 and above are counted as permanently employed if they hold a permanent contract or an FTC with a duration of no less than six months. On the other hand, seasonal workers include persons (15 years and older) whose employment contract is limited to a maximum of six months (Destatis 2017a, p. 36f.). The ASE asks farmers for the number of seasonal workers employed within one year of the survey (hereinafter referred to as "unique worker" approach). In contrast, our data calculates the number of seasonal workers as a monthly stock. Only for the purpose of comparing the numbers with the ASE, we convert our monthly stocks of seasonal workers to the unique worker concept. Table 2 shows only slight differences in the number of seasonal workers between both data sources in 2015.[16] In 2012, the difference between the numbers is slightly larger and, in addition, ASE's number of seasonal workers is falling, while according to our calculations, the trend is positive. This may be due to the fact that there are also different time trends in terms of overall employment between ASE and BA data.

Table 2: Seasonal Workers Compared to the Farm Structure Survey (ASE)

		2012	2015
Number of Seasonal Workers	ASE	314,300	286,300
	Own Calculations	249,000	274,600
Share of Seasonal Workers	ASE	30.8%	30.5%
	Own Calculations	39.1%	39.5%

Note: The numbers of the ASE are collected according to the unique worker concept. The underlying question in the current questionnaire is: "Were seasonal workers employed in the agricultural business from March 2015 to February 2016?" (Destatis, questionnaire ASE-S 2016). The comparative figures from our own estimation of seasonal workers were calculated in the same manner, but within the time frame January to December of the respective years. Yet, this is unlikely to affect comparability due to the low number of seasonal workers in January and February.
Source: Destatis (2017b, 2014), Fachserie 3 Reihe 2.1.8, own calculations. The proportion of seasonal workers also includes assisting family members for better comparability with the BA data.

There is a larger difference between the two data sources in terms of the proportion of seasonal workers: while the ASE estimates the share of seasonal workers in total workers at 30.5% in 2015, we

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[16] Table 2 deliberately takes into account assisting family members, as the ASE includes only family members who are paid and thus also included in our data. However, it should be noted that ASE's family members are not further subdivided into permanent and seasonal workers, which is likely to lead to multiple counts of assisting family members in these two areas. This is one of the reasons why the numbers of the ASE are not directly comparable with the seasonal labor force figures estimated from the BA microdata.

estimate a share of 39.5%. The reasons for the differences between the data from the ASE and our calculations may be due to differences in the collection and delineation of seasonal work.[17]

One benefit of the ASE survey approach is, in our view, that it also covers seasonal workers who are not notifiable in Germany (see Section 3.5), whereas these are missing in our data.[18] Overall, it can be stated that the operationalization of seasonal work on the basis of the BA data approximates the data in the ASE, in spite of remaining uncertainties due to the different survey logics.

4 Scope, Structure and Development of Seasonal Work

4.1 Development and Composition of Seasonal Work by Type of Employment and Years

Figure 1 gives an overview of the estimated number of seasonal workers in Germany. This is the average number of occupations classified as seasonal work in each month of the years shown. Measured in absolute numbers, the hotel and restaurant industry has the highest importance of seasonal work among the three research sectors. In 2016, its average seasonal workforce amounted to about 146,000.[19] In agriculture and forestry, on the other hand, there are only about 44,000 seasonal working relationships, and only about 6,000 can be reported in gardening and landscaping. Of course, this is due to the different sizes of the industries. Looking at the share of seasonal employment in all employment relationships (Figure 2), agriculture and forestry, with an annual average of 12.4%, is the sector with the highest seasonal activity, followed by hotels and restaurants (8.4%) and gardening and landscaping (4.2% in 2016).

Since the beginning of the period under review in 2012, the number of seasonal working relationships in all sectors has increased slightly. Between 2014 and 2015, when the minimum wage was introduced, there is an increase in the number of seasonal workers in agriculture and forestry and the hotel and restaurant industry, but not in gardening and landscaping. Here, their number initially drops, but in 2016 it rises again above the 2014 level. It should be noted that this is only a temporal parallelism, and not necessarily a causal effect of the introduction of the minimum wage. In agriculture and forestry the share of seasonal work relationships in all employment relationships rose since the introduction of the minimum wage (13.2% in 2015 versus 12.2% in 2014), while in gardening and landscaping (3.7% in 2015 versus 4.4% in 2014) a lower proportion of seasonal work relationships can be observed. However, in 2016 both deviations are again approaching the level of 2014 (12.5% and 4.2%, respectively). In the hotel and restaurant industry, the shares are relatively constant (2014: 8.8%, 2015: 8.9%, 2016: 8.4%).

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[17] The ASE only surveys farms above several thresholds such that employees of smaller companies are not included. The ASE does not distinguish family workers into permanent and seasonal workers, which may result in multiple counts in the total number of employees. Furthermore, in the ASE, people with a fixed-term contract of up to six months count as seasonal workers, while our calculations are based on a maximum of seven months. Last but not least, the ASE is a questionnaire that goes along with the usual blurs in response behavior (recall bias, telescoping) and therefore cannot agree with the BA's process data.

[18] However, the questionnaire does not refer to this particular issue, which means that it is up to the respondents whether they have German seasonal workers present and take them into account in the answer or not.

[19] The sample allows the estimation of the number and the proportion of seasonal work relationships with a high precision (± 0.1 percentage points and ± 1,000 employment relationships, respectively). In the further analysis we thus dispense with designating confidence intervals.

Figure 1: Number of Seasonal Employment Relationships by Industry, Employment Form and Years
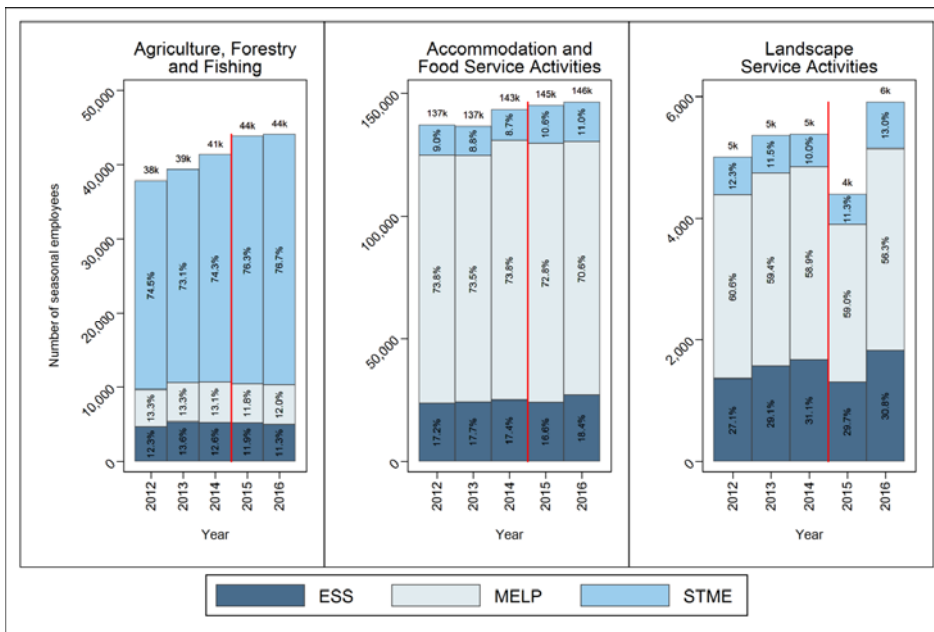
Reference line: Introduction of the minimum wage on 01.01.2015. ESS: Employees subject to social security contributions. MPTE: Marginally paid (part-time) employees. STME: Short-term employees.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Figure 2: Share of Seasonal Work Relationships in All Employment Relationships by Industry and Years
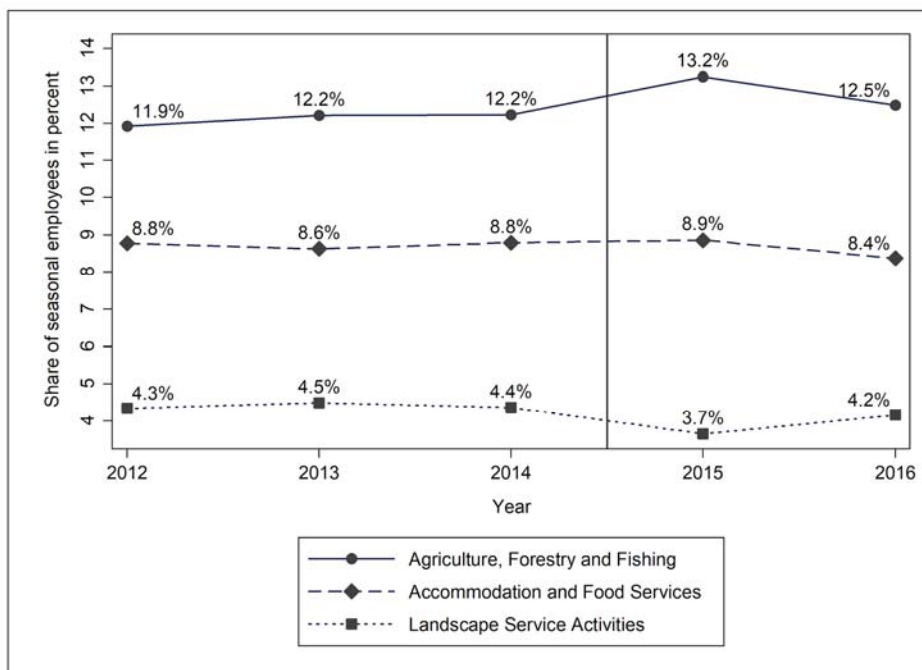
Reference line: Introduction of the minimum wage on 01.01.2015.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Major differences between the research sectors arise with regard to the composition of seasonal work. While in agriculture and forestry in 2016 around 77% of all seasonal work is short-term employment, in the hotel and restaurant sector and in gardening and landscaping marginally paid employment is the dominant form of employment (71% and 56% of all employment relationships, respectively). It

may play a role that this form of employment is particularly well-suited to a secondary occupation which is more frequent in these two sectors than in agriculture and forestry.

In agriculture and forestry, the large share of short-term employment in seasonal work is further increased in the period under review. At the same time, the large group of marginally paid seasonal workers in both the hotel and restaurant and the gardening and landscaping sectors has been falling since 2012, and particularly, since the introduction of the minimum wage in 2015 (hotels and restaurants: from about 74% in 2012 to 71% in 2016, gardening and landscaping: from about 61% in 2012 to 56 % in 2016). In the hotel and restaurant business, this development takes place both in favor of the share of temporary seasonal work subject to social security contributions and short-term employment. In gardening and landscaping, on the other hand, above all short-term employment is rising. These movements could be accompanied by corresponding conversions of mini-jobs. At least for the conversion of mini-jobs into employment subject to social security contributions in the course of the introduction of the minimum wage, there are first findings for total employment (ie. seasonal work and non-seasonal work as a whole -see vom Berge and Weber 2017, Garloff 2016, Bossler 2016).

## 4.2 Development and Composition of Seasonal Work by Type of Employment and Months

Of course, the numbers and shares of seasonal working relationships differ considerably during a year. In agriculture and forestry as well as gardening and landscaping their number increases three to four times between the fringe months and the peak month. For hotels and restaurants, the rate of increase in the hotel and restaurant industry is between 700% and 800% (Figures 3 to 5). These changes in the intensity of the fluctuations show a stable pattern over the period of observation.

Figure 3: Number of Seasonal Employment Relationships by Employment Form and Months, Agriculture and Forestry
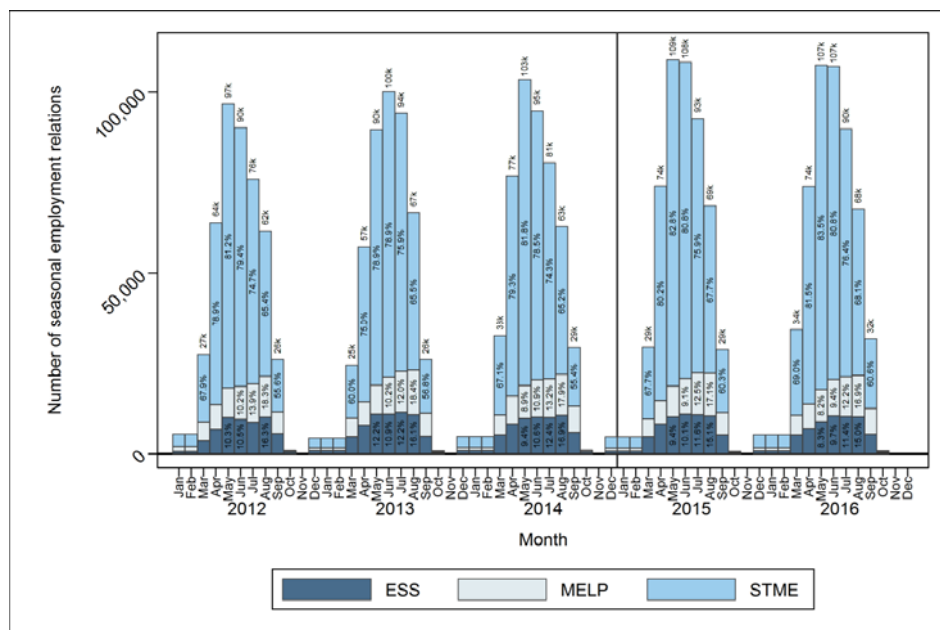
Reference line: Introduction of the minimum wage on 01.01.2015. ESS: Employees subject to social security contributions. MPTE: Marginally paid (part-time) employees. STME: Short-term employees.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.
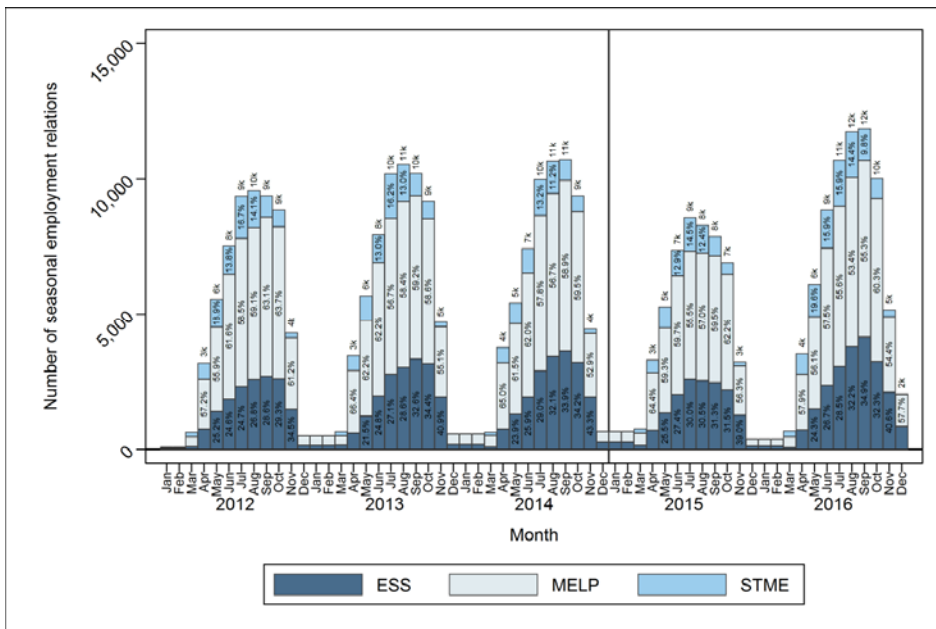
Figure 4: Number of Seasonal Employment Relationships by Employment Form and Months, Hotels and Restaurants
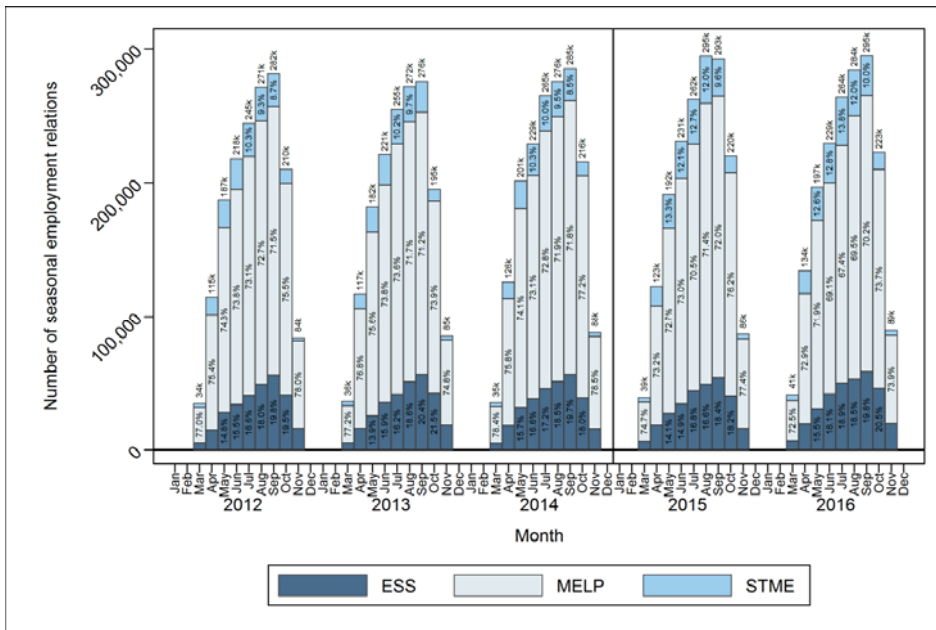
Reference line: Introduction of the minimum wage on 01.01.2015. ESS: Employees subject to social security contributions. MPTE: Marginally paid (part-time) employees. STME: Short-term employees.
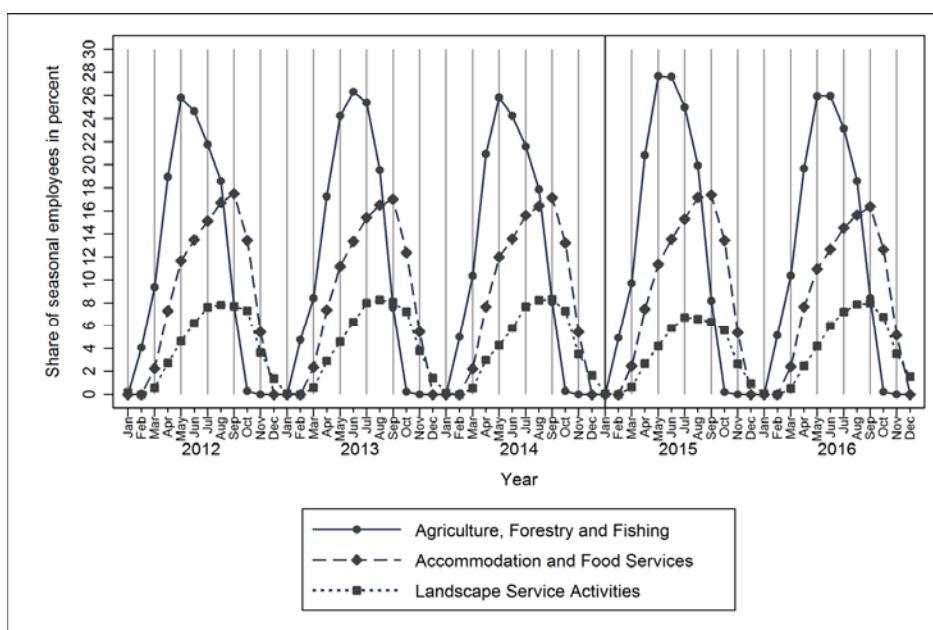Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Figure 5: Number of Seasonal Employment Relationships by Employment Form and Months, Gardening and Landscaping

Reference line: Introduction of the minimum wage on 01.01.2015. ESS: Employees subject to social security contributions. MPTE: Marginally paid (part-time) employees. STME: Short-term employees.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Also, the composition of seasonal work changes considerably in the course of a year. In agriculture and forestry, the largest group of seasonal work (short-term employment) further expands during the peak months. By contrast, in hotels and restaurants and gardening and landscaping the dominant form of seasonal work (marginally paid employment) is slightly reduced in the peak months compared to the

fringe months. In return, above all, the proportion of employees subject to social security contributions increases. These could be acute needs for seasonal work, which could not be realized through the relatively little input of working time that marginally employed people can contribute. Changes parallel to the introduction of the minimum wage cannot be detected during the observation period.

The strong fluctuations in the number of seasonal working relationships are also reflected in their share in all employment relationships in the sectors (Figure 6). For example, if the share of seasonal work in agriculture and forestry in March of the period under review is about 9.7%, more than a quarter of all employment relationships in May are seasonal work. In the hotel and restaurant industry, between the marginal month of March and the peak month of September, there is a margin of 2.3% to 17.1% seasonal work, and in gardening and landscaping from 0.6% to 7.7%.

Figure 6: Share of Seasonal Work Relationships in All Employment Relationships by Months

Reference line: Introduction of the minimum wage on 01.01.2015.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

4.3   Socio-Demographic Structure of Seasonal and Ordinary Workers and Job Features

Table 3 contains an overview of the socio-demographic composition of seasonal and non-seasonal workers, pooled across 2012 to 2016.[20] Major differences between seasonal and non-seasonal workers occur in agriculture and forestry. For example, the proportion of women among seasonal workers in agriculture is considerably higher than among non-seasonal workers (49.1% vs. 37.2%), while the differences between the other two sectors are modest. In all three sectors, seasonal workers are considerably younger than non-seasonal workers. As far as nationality is concerned, there are far fewer German seasonal workers than non-seasonal workers (29.9% vs. 85.4% Germans) in agriculture and forestry. To a lesser extent, this also applies to gardening and landscaping: there are 77.8%

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[20] See the appendix for graphs of the regional distribution of seasonal working relationships in Germany. Regional heterogeneity in the use of seasonal work is particularly pronounced in agriculture and forestry, as well as in the hotel and restaurant sector (Figures 7 and 8).

Germans among seasonal workers and 86.6% among non-seasonal workers. In the hotel and restaurant industry, on the other hand, there are no major differences in this regard.

The share of workers without information on education and training differs considerably between seasonal and non-seasonal workers in agriculture and forestry, while in the other two sectors smaller differences can be observed. The high proportion of seasonal workers without information on education and training in agriculture and forestry may be due to the fact that seasonal work is largely made up of short-term employment there - possibly the information on the education of employees is less extensively reported here than in the others forms of employment. In addition, the majority of seasonal workers in agriculture and forestry come from abroad with corresponding difficulties in matching them to their German counterpart degrees.

In all three sectors investigated, the proportion of people without vocational training among all seasonal workers that do provide information on education and training is much higher than among *non*-seasonal workers with information on education and training (agriculture and forestry: 37.3% versus 11.9%, hotels and restaurants: 33.2% versus 21.5%, gardening and landscaping: 28.2% versus 14.9%).

While in agriculture and forestry the part-time quota (including mini-jobs) of seasonal workers is lower than that of non-seasonal workers, it is the opposite for hotels and restaurants and gardening and landscaping, where side jobs are a major driver behind seasonal work.

Table 3: Socio-demographic Structure of Seasonal Workers and Non-seasonal Workers, 2012-2016 (Average)

			Agriculture, Forestry and Fishing	Hotels and restaurants	Gardening and Landscaping
Share of women (in percent)	Non-SW		37.2	60.9	21.7
	SW		49.1	60.6	19.7
Age (in years)	Non-SW		43.4	39.2	42.4
	SW		36.9	30.4	35.0
Nationality (in percent)	Non-SW	Germany	85.4	77.0	86.6
		EU15 + EFTA	0.9	5.6	2.5
		12 new EU countries	11.9	4.6	4.1
		Other Eastern European	0.6	3.2	3.4
		Rest of the World	1.2	9.6	3.4
	SW	Germany	29.9	76.3	77.8
		EU15 + EFTA	0.5	4.9	2.1
		12 new EU countries	67.0	5.7	11.1
		Other Eastern European	1.6	3.3	4.2
		Rest of the World	1.1	9.8	4.8

			Agriculture, Forestry and Fishing	Hotels and restaurants	Gardening and Landscaping
Schooling and vocational education (in percent)	Non-SW	No vocational education and training (VET)	10.0	17.3	12.9
		Low/middle secondary school + VET	61.0	46.4	61.6
		High school, no VET	1.3	5.6	1.4
		High school + VET	5.0	6.9	5.6
		Applied College Degree	0.9	0.6	0.8
		Academic Degree	5.8	3.5	4.3
		Unknown	16.0	19.7	13.2
	SW	No vocational education and training (VET)	13.4	26.5	22.4
		Low/middle secondary school + VET	17.3	31.1	41.7
		High school, no VET	1.8	10.3	6.2
		High school + VET	1.9	7.2	5.5
		Applied College Degree	0.2	0.5	0.4
		Academic Degree	1.3	4.1	3.2
		Unknown	64.1	20.2	20.5
Share of part-time employees (in percent)	Non-SW		41.3	68.1	34.3
	SW		35.8	87.9	70.6

Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

5 Summary and Conclusions

The aim of this paper is to revise and supplement the current state of research on seasonal work in Germany for the agriculture and forestry sector, the hotel and restaurant industry as well as gardening and landscaping. We focus on the number of seasonal workers, their socio-demographic structure and temporal development.

Relatively little is known about the **number of seasonal workers** in Germany, not to mention their socio-demographic structure and their working conditions due to a lack of data: in 2010/11 (data on) seasonal work permits issued by the national authorities ceased to exist, and there are only few other, highly specialised data on seasonal workers (among which most notably the Farm Structure Survey by the German Federal Statistical Office, Agrarstrukturerhebung - ASE).

We estimate seasonal work using a **representative sample of the Employment History (BeH) of the Federal Employment Agency (BA).** Most notably, our sample includes data on short-term employees at the person level which have never been used in scientific research before. The extent and structure

of seasonal work can be approximated well with our data. A comparison with the ASE shows reasonable differences that are due to the different data collection processes.

Our analyses reveal clear differences between economic sectors. The highest shares of seasonal work are attained in agriculture and forestry, followed by hotels and restaurants and gardening and landscaping. In 2016, the average share was 12.5% in agriculture and forestry and 8.4% in the hotel and restaurant industry. In gardening and landscaping, however, it was only 4.2%. As for the sheer number of seasonal workers, however, the hotel and restaurant industry is far ahead due to its overall size. On average, there were about 146,000 seasonal workers employed in each month of 2016 - in agriculture and forestry it were only about 44,000 (gardening and landscaping: 6,000).

The largest fluctuations during a year can be observed in the hotel and restaurant industry, where the number of seasonal workers increases seven to eight times between the marginal months and the peak month. In agriculture and forestry as well as gardening and landscaping, the fluctuations during a year are "only" about half as strong; nevertheless, they also point to a considerable importance of seasonal work as a buffer against temporary workload in these industries.

The composition of seasonal workers differs between economic sectors. While in agriculture and forestry the vast majority is given by short-term employment, in the hotel and restaurant industry and gardening and landscaping marginally paid (part-time) employment is the dominant type of seasonal work (due to the sectors' high inclination towards side jobs). In agriculture and forestry, seasonal workers are predominantly nationals of an EU member state and only about one third are German citizens. In gardening and landscaping, on the other hand, about three-quarters of all seasonal workers are of German nationality. While we found a high proportion of seasonal workers without vocational training in all economic sectors investigated, there is also a high number of people that do have completed a vocational training.

Since 2012, the number of seasonal workers has increased in all investigated economic sectors. That said, there are hardly any signs of significant spikes since the introduction of the minimum wage in 2015. Our - purely descriptive - analyses show the share of seasonal workers has - at least in the long run - remained roughly constant since the introduction of the minimum wage.

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Corresponding author: Jochen Späth, Institute for Applied Economic Research, Ob dem Himmelreich 1, 72074 Tübingen, Germany, +49.7071.9896-14, jochen.spaeth@iaw.edu.

Appendix

Figure 7: Determination of Location and Duration of the Seasonal Window

2007-2015

a) Employees subject to social insurance contribution, marginally employed employees, short-term employed employees

	Sector	Jan	Feb	Mrch	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	7-months seasonal window	9-months seasonal window
														Employment share within	
Absolute	Agriculture and forestry	229,346	237,496	258,238	303,772	335,053	327,694	313,030	293,351	297,004	278,546	255,440	230,034	61.6%	77.3%
	Hotels and restaurants	1,208,758	1,218,083	1,244,388	1,283,943	1,313,861	1,325,110	1,331,411	1,324,103	1,303,837	1,277,243	1,254,811	1,243,796	59.8%	76.1%
	Gardening and landscaping	90,524	91,210	99,367	105,601	108,591	110,015	110,982	110,446	109,927	109,704	107,280	95,467	61.3%	77.8%
														Number of months above annual average	
As a percentage of peak month	Agriculture and forestry	68.5%	70.9%	77.1%	90.7%	100.0%	97.8%	93.4%	87.6%	88.6%	83.1%	76.2%	68.7%	6	
	Hotels and restaurants	90.8%	91.5%	93.5%	96.4%	98.7%	99.5%	100.0%	99.5%	97.9%	95.9%	94.2%	93.4%	6	
	Gardening and landscaping	81.6%	82.2%	89.5%	95.2%	97.8%	99.1%	100.0%	99.5%	99.0%	98.8%	96.7%	86.0%	8	

b) Employees subject to social insurance contribution

	Sector	Jan	Feb	Mrch	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	7-months seasonal window	9-months seasonal window
														Employment share within	
Absolute	Agriculture and forestry	166,283	171,024	184,681	196,273	201,940	200,426	197,999	197,124	200,739	196,194	186,455	169,224	60.8%	77.0%
	Hotels and restaurants	710,524	715,752	733,173	756,750	773,989	778,362	779,148	779,744	777,680	762,971	744,583	735,681	59.8%	76.1%
	Gardening and landscaping	72,396	72,948	80,409	86,532	89,036	90,173	90,567	90,681	90,835	90,597	88,439	77,562	61.6%	78.2%
														Number of months above annual average	
As a percentage of peak month	Agriculture and forestry	82.3%	84.7%	91.5%	97.2%	100.0%	99.3%	98.0%	97.6%	99.4%	97.2%	92.3%	83.8%	7	
	Hotels and restaurants	91.1%	91.8%	94.0%	97.1%	99.3%	99.8%	99.9%	100.0%	99.7%	97.8%	95.5%	94.3%	7	
	Gardening and landscaping	79.7%	80.3%	88.5%	95.3%	98.0%	99.3%	99.7%	99.8%	100.0%	99.7%	97.4%	85.4%	8	

c) Marginally employed employees

	Sector	Jan	Feb	Mrch	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	7-months seasonal window	9-months seasonal window
														Employment share within	
Absolute	Agriculture and forestry	57,222	57,279	58,261	60,454	62,471	62,854	61,934	60,882	60,712	60,477	59,314	58,490	59.4%	75.7%
	Hotels and restaurants	492,402	495,958	503,506	517,414	527,843	533,133	535,575	527,771	513,438	506,856	504,175	504,365	59.4%	75.8%
	Gardening and landscaping	17,872	17,916	18,332	18,398	18,773	18,992	19,176	18,768	18,446	18,481	18,437	17,766	49.8%	58.5%
														Number of months above annual average	
As a percentage of peak month	Agriculture and forestry	91.0%	91.1%	92.7%	96.2%	99.4%	100.0%	98.5%	96.9%	96.6%	96.2%	94.4%	93.1%	7	
	Hotels and restaurants	91.9%	92.6%	94.0%	96.6%	98.6%	99.5%	100.0%	98.5%	95.9%	94.6%	94.1%	94.2%	5	
	Gardening and landscaping	93.2%	93.4%	95.6%	95.9%	97.9%	99.0%	100.0%	97.9%	96.2%	96.4%	96.1%	92.6%	5	

d) Short-term employed employees

|	Sector	Jan	Feb	Mrch	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	7-months seasonal window	9-months seasonal window
														Employment share within	
Absolute	Agriculture and forestry	5,841	9,192	15,296	47,045	70,843	64,414	53,097	35,345	35,553	21,874	9,672	2,320	79.7%	90.9%
	Hotels and restaurants	5,832	6,373	7,709	9,779	12,029	13,615	16,688	16,588	12,719	7,416	6,054	3,749	71.8%	83.2%
	Gardening and landscaping	256	346	625	671	782	849	1,239	997	646	627	404	140	76.6%	90.2%
														Number of months above annual average	
As a percentage of peak month	Agriculture and forestry	8.3%	13.0%	21.7%	66.6%	100.0%	91.2%	75.2%	50.0%	50.3%	31.0%	13.7%	3.3%	6	
	Hotels and restaurants	34.9%	38.2%	46.2%	58.6%	72.1%	81.6%	100.0%	99.4%	76.2%	44.4%	36.3%	22.5%	5	
	Gardening and landscaping	20.7%	28.0%	50.5%	54.2%	63.2%	68.5%	100.0%	80.4%	52.1%	50.6%	32.6%	11.3%	6	

Calculations without multiple job holders.
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Figure 8: Share of Seasonal Work relationships in All Employment Relationships by Federal State, Agriculture and Forestry, 2016
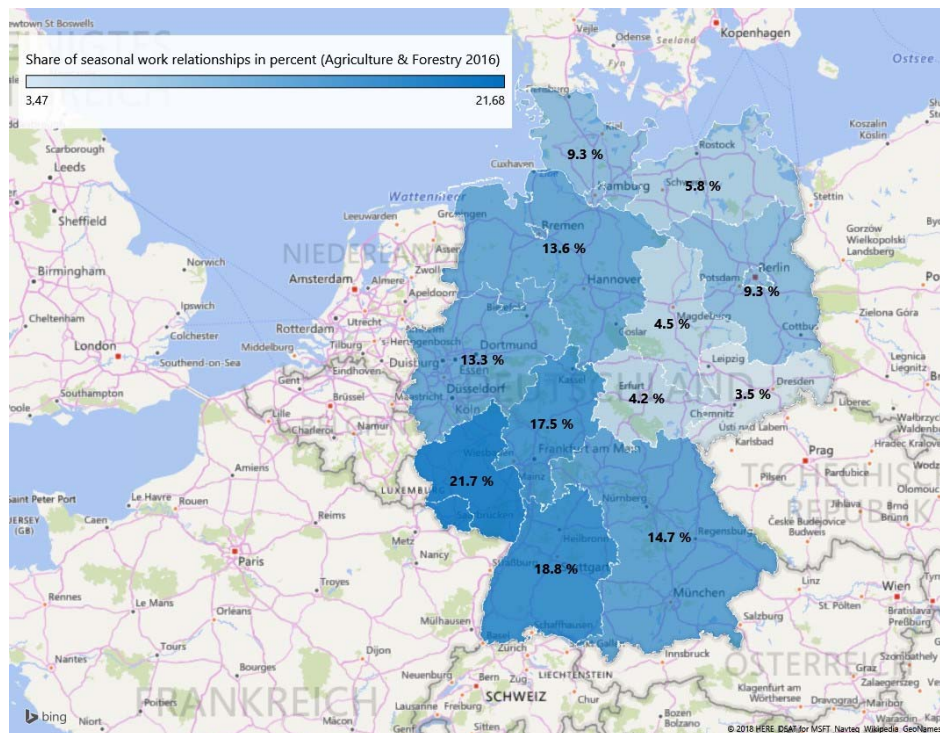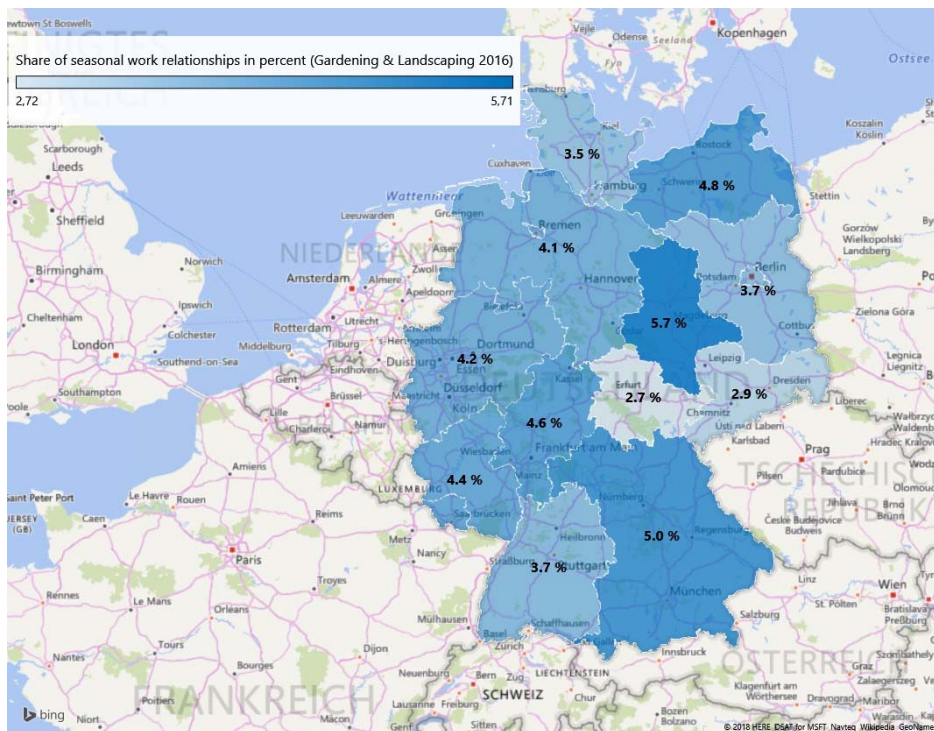

Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Figure 9: Share of Seasonal Work relationships in All Employment Relationships by Federal State, Hotel and Restaurants, 2016
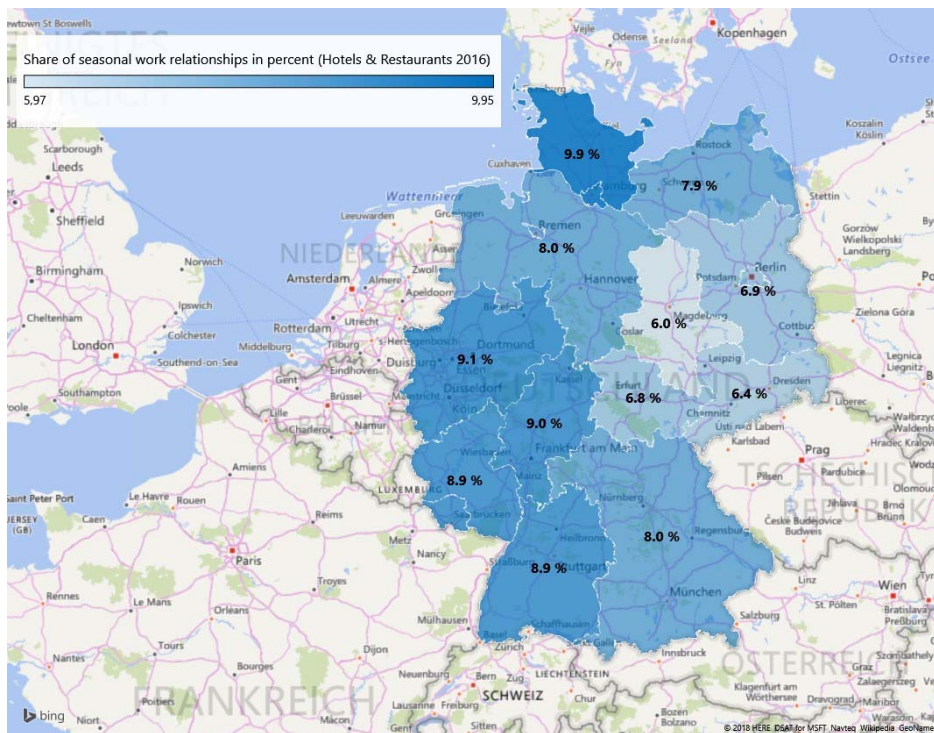
Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

Figure 10: Share of Seasonal Work relationships in All Employment Relationships by Federal State, Gardening and Landscaping, 2016

Source: IAB Beschäftigtenhistorik (BeH) V10.02.00, Nürnberg 2017, own calculations.

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