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# ABSTRACT

## Temporary Agency Work in Portugal, 1995–2000*

There is widespread belief that workers in temporary agency work (TAW) are subject to poorer working conditions, in particular pay, than comparable workers in the rest of the economy. The first aim of this analysis is to quantify the wage penalty, if any, for workers in TAW. Secondly, we analyze the wage profile of workers before and after spells of TAW. Linked employer-employee data for Portugal enable us to account for observable as well as unobservable worker quality. Our results show that workers in TAW earn lower wages than their peers and that this difference is mostly due to the workers' characteristics. We estimate that workers in TAW earn on average 9% less than comparable workers in the rest of the economy if we control for the workers' observable attributes only; this difference is reduced to 1% when we control for unobservable characteristics as well. However, interesting differences emerge across groups. Younger workers, both men and women, earn higher wages in TAW than their peers in other firms, as opposed to prime-age and older workers. Moreover, for young workers TAW is not associated with a stigma effect that slows wage progression after working for TAW, contrary to prime-age and older workers, in particular males. The wage trends are also different before entering TAW. Prime-age and older workers see their wages deteriorate relative to their peers before entering TAW, suggesting that adverse labor market conditions may motivate them to search for a TAW job. We do not detect any pre-TAW wage trend for young workers.

JEL Classification: D21, J31, J40

Keywords: temporary work agencies, temporary help service, matched employer-employee data, Portuguese labor market

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# 1 Introduction

> There is much anecdotal evidence of poor working conditions in agency work, but much less hard evidence. None of the research referred to can differentiate between factors related to agency work *per se* (as a form of employment) and those related to the job or the worker. (Storrie, 2002, p56)

Employment in temporary agency work (TAW) has increased throughout Europe over the last decade. This development has prompted the European Commission to propose a directive to safeguard TAW workers' working conditions. In 2002 it issued a proposal for a European Parliament and Council Directive on working conditions for TAW workers (EIRO, 2002; European Commission, 2002), which aims to ensure that temporary workers are not discriminated against, receiving at least as favorable a treatment as a regular comparable worker in the firm where (s)he is posted. The relevant dimensions are the basic working and employment conditions, including duration of working time, rest and holiday periods, time of work, and seniority.

This concern comes from widespread evidence that workers in TAW face worse working conditions than comparable workers in the placement firm. Evidence in Houseman (2001) suggests that TAW may be used to save on worker benefit costs, such as health insurance and pension contributions. These concerns extend to wage rates as there seems to be evidence of lower wages for TAW workers.

Concern about workers in TAW has also focused on whether they remain in low-paying, dead-end jobs or if they find, should they so desire, employment in a standard working career. High turnover involves a loss of firm-specific human capital, a decrease in productivity if production depends on continuous cooper-

ation of workers, and possibly less coverage by trade unions, factors that may contribute to poorer career prospects. On the contrary, TAW could serve as a screening method (Autor, 2001; Houseman, 2001) at little cost for the firm, i.e. without a commitment about a future employment contract. Since TAW work matches a worker typically with several firms, it can be seen as a job matching mechanism.

The discussion has thus concentrated on whether or not workers in TAW employment earn lower wages and whether or not TAW employment enables workers to start a better career. There are numerous studies for the US that find that TAW workers receive lower wages than other workers, e.g., Segal and Sullivan (1997) who report an average wage difference of about 28% which is reduced to about three percent when observable and time-invariant unobservable characteristics are considered. (See also, amongst others, Blank (1998) or Nollen (1996).)

Workers may accept lower wages in TAW because the employment in these firms allows a subsequent job match with better pay or more stable careers. Autor and Houseman (2005), using random placement assignments, do not find that TAW work is associated with stable careers in post-TAW employment. For welfare recipients, however, Heinrich, Mueser and Troske (2005) find that work in TAW is associated with better outcomes than not working at all.

The evidence for European countries is mixed. For example, Forde and Slater (2005) report a wage penalty of about 11 percent for men and 6 percent for women in TAW in contrast to comparable workers in the UK. Zijl, van den Berg and Heyma (2004) find for the Netherlands that TAW work is associated with subsequent stable employment spells. Similarly, Amuedo-Dorantes, Malo and Muñoz-Bullón (2006), for Spain, Booth, Francesconi and Frank (2002), for the

UK, and Ichino, Mealli and Nannicini (2006), for Italy, find that TAW work is associated with subsequent stable employment. However, Kvasnicka (2005) finds for Germany that TAW work does not improve the subsequent careers of such workers, and Antoni and Jahn (2006) find that TAW workers in Germany are increasingly found in repeated spells of TAW work.

We use linked employer-employee data, obtained from the Ministry of Employment in Portugal, to analyze wages of workers in TAW. These administrative data cover the universe of Portuguese workers in the private sector for the period 1995-2000. The panel dimension of these data allow us to control for worker and industry specific effects.

The purpose of the paper is twofold. We analyze, first of all, if TAW workers earn lower wages than comparable workers in other sectors by estimating wage regressions. Because participation in TAW work is not random, we control for workers' fixed-effects in our estimations, taking advantage of the longitudinal nature of the data. We perform the analysis separately for men and women as well as for younger and older workers, since these groups tend to fare differently in the labor market. (We also perform the analyzes on the pooled sample.) Secondly, we analyze workers wages before and after spells of TAW. On the one hand, we want to assess if TAW work leads to lower wages in subsequent employment, i.e evidence of a stigma effect. On the other hand, we want to investigate if workers experienced a particular wage development before entering TAW. For example, their wages could be deteriorating relative to similar workers, in which case the adverse labor market conditions would provide the motivation to search for a TAW job.

Our empirical results suggest that TAW workers earn about one per cent less than similar workers in other firms, once their observable and unobservable at-

tributes are controlled for. However, disaggregation of the sample by age and gender reveals interesting differences across groups of workers. Younger workers, both men and women, earn higher wages in TAW than their peers in other firms. Prime-age workers, in particular men, earn a lower wage in TAW than similar workers in other firms. Also interestingly, for young workers, TAW is not associated with a stigma that slows their wage progression after they start to work in the TAW sector. In contrast, for prime-age and older workers, in particular males, wage progression after entering TAW is slower than for similar workers not engaged in TAW. Before entering TAW, prime-age workers, both men and women, see their wages deteriorate relative to their peers, suggesting that adverse labor market conditions might motivate them to search for a TAW job. For young workers, we do not detect any pre-TAW wage trend.

# 2 Background

## 2.1 The association between TAW work and wages

The distinguishing feature of work for a TAW firm is the tripartite nature of the relationship and the commercial nature of the contract signed between the TAW firm and the placement firm, which sets it apart from a traditional labor contract between a worker and a firm. Even though a particular assignment of a worker is temporary, it is not the duration of the contract that characterizes this sector.

While there is widespread belief that TAW workers earn lower wages than comparable workers, in particular in countries where labor legislation is not stringent or trade union coverage is low, there are also reasons, and evidence, that point to the opposite direction. TAW workers may earn a higher wage that would compensate for the risk of a more variable income stream than comparable work-

ers. It is also sometimes stressed that TAW have difficulty recruiting workers and need to offer favorable conditions to attract them. Storrie (2002) reports that at the the upper end of the pay scale, for instance in the health sector, TAW workers seem to enjoy better pay and possibly better working conditions than regular workers. The wages in TAW are thus an empirical issue which we will address in more detail below.

Some TAW may choose to offer free general training instead of higher wages to attract more workers and to identify better quality workers (Autor, 2001). In general, the need to attract workers and the existence of economies of scale in the provision of some types of training have been pointed out as reasons why TAW may provide more training than legally required. Such training could result in higher wages in post-TAW employment.

On the contrary, Storrie (2002) reports evidence of circumvention of employment standards for TAW workers, especially in terms of pay and working time regulations, and also evidence of other, illegal abuse. The short employment spells, possibly combined with low investment in human capital, and fewer workers' rights due to lower coverage by trade unions are typically factors that characterize poor career prospects.

## 2.2 Legal setting in Portugal

The market for TAW is tightly regulated in Portugal.[1] Permission to operate as a TAW firm is granted by the Ministry of Employment and Social Security. Candidates must show proof of a clean criminal record, previous compliance with labor law and tax and social security duties, technical capacity (i.e., a qualified director with experience of running human resources and supporting administra-

[1] Decree-Law 358/89, Law 39/96, and Law 146/99.

tive staff), as well as a sound financial situation.[2] TAW firms are allowed a wide range of activities, which include recruitment and selection of personnel, vocational orientation, training, consulting and human resources management. The operation of the firm is regularly monitored by the Bureau of Labor Inspection and it must present records of workers hired out to using firms every six months.

The work contract is signed between the TAW firm and the worker. The formal employer is thus the TAW firm, and not the user firm, and it is responsible in particular for paying the workers, fulfilling the employer's Social Security obligations, providing insurance against work-related accidents, and allocating a minimum of 1% of the total turnover to training. (The TAW firm is legally forbidden to charge the worker for training provided.) The user firm is responsible for fulfilling regulations on health and security at the workplace.

The work contract between the worker and the TAW firm can be open-ended or of limited duration. If open-ended, the worker is entitled to pay, even in periods when (s)he is not actually assigned to a using firm. The amount is specified by collective bargaining or, if the worker is not covered, two thirds of the national minimum wage.

Firms have to justify the hiring of temporary workers and a narrow set of reasons is permitted: to replace workers on leave; for seasonal work; in case of a temporary increase in product demand; to bridge recruitment gaps, while the process to fill a vacancy is taking place.

The contract between the TAW firm and the using firm must also specify, among other things, the duration of the assignment (which depends on the reason for use of temporary work, with a maximum limit of six months to two years), the

[2] A fund linked to the national minimum wage must be deposited, or a bank or insurance company guarantee presented, which is used for wage payments if the company does not pay its workers.

description of tasks to be performed, the wage the using firm pays its workers who perform similar tasks, and the amount paid to the TAW firm. A TAW worker is entitled to the wage set by collective bargaining for TAW work or the wage paid by the user firm to similar workers, whichever is higher. Because these rules aim at providing equal treatment for regular and TAW workers, we would expect to see no, or a moderate, pay differential between TAW and regular workers. Over 90% of the TAW workers are covered by a collective bargaining contract, signed between trade unions and employer representatives.[3]

The regulations are monitored and enforced by the Bureau of Labor Inspection. However, situations of non-compliance with the law are frequently discussed in the press, where TAW owners associations demand stricter controls by the Bureau, arguing that law-obeying firms are subject to unfair competition by firms that do not fulfill the law, especially the payment of taxes and Social Security contributions. Trade unions, on the other hand, claim that workers' rights are not always respected and also demand stricter monitoring. Finally, the Bureau of Labor Inspection claims that the firms in the sector are subject to close scrutiny and argues for higher legal sanctions to increase compliance.

Although the legalization and regulation of this type of work took place relatively early in comparison to other European countries, the use of TAW is not as widespread in Portugal as in other European countries. In 1999, it comprised about 1% of total employment, below the European Union average of about 1.4%. In terms of growth, although employment in the sector more than doubled between 1995 and 1999, its growth has been modest when compared to most other European countries (Storrie, 2002, p23).

[3]In Portugal, a contract signed between workers' and employers' representatives is often extended to the all workers in a sector or firm, irrespective of their union membership status.

# 3 Data

The study is based on linked employer-employee data collected annually by the Ministry of Employment in Portugal. The data cover all firms with wage-earners in manufacturing and services in the private sector; because data provision is compulsory only for companies with wage-earners, the coverage of the agricultural sector is low. Public administration and domestic work are not covered. Reported data include the firm's industry, location, employment, ownership (foreign, private or public) and sales, and the worker's gender, age, occupation, schooling, date of admission into the company, monthly earnings, and duration of work. We use data from 1995 to 2000 since identification of TAW work was not possible for earlier years.

The Portuguese Classification of Industries reports, under code 74500, firms in "labor recruitment and provision of personnel".[4] This is the definition we use to identify temporary help service firms and their workers.[5] Given the relevance of the distinction between stocks and flows for this activity (with high worker turnover), it should be stressed that the data refer to the stock of workers at a reference week in October each year.[6] Wage-earners aged 16 to 65 years were selected for analysis. We consider only the worker's main job, defined as the job where the most hours were worked per month. Extensive checks have been performed to guarantee the accuracy of the data, using gender, date of birth, highest educational level and starting date in a company (details on the procedures followed to clean the panel can be found in Cardoso (2005).)

[4]This classification follows closely NACE, the Classification of Economic Activities in the European Community. Before 1995, a different industry classification, which did not assign a specific code to this activity, was used.

[5]This definition has the disadvantage that we cannot distinguish between managers and clerical staff that operate the TAW and the workers who are hired out to using firms.

[6]Because of the timing of observations, we do not analyze the job tenure with a temporary agency because not all jobs of short duration are captured in the data.

The administrative nature of the data and the legal requirement for the firm to post the data in a space public to its workers contribute to its reliability. Workers are identified by a personal identifier, based on a transformation of the social security number, and it is thus possible to track them over time, as long as they work in the private sector. If they are missing from the database, the workers could be, among other situations, unemployed, inactive, employed in the public administration or self-employed without dependent workers and we cannot ascertain the employment status.

In the analyzes that follow, we will keep the whole population of workers who ever had a TAW job, while limiting the data on workers who never had a TAW job to a 10% sample, so as to keep computations manageable. For each worker sampled, all the available observations on his/her work history were kept for analysis. We report results on the overall sample, as well as separately for women and men of 16 to 25 years of age and for women and men of 26 to 65 years of age.

Gross hourly wages were computed and they were deflated using the Consumer Price Index (with the year 2000 as the base period). Wage outliers, i.e., hourly wages of less than half the first percentile or above 20 times percentile 99, have been dropped from the analysis.

# 4 Descriptive evidence on the labor force of TAW and their career prospects

The number of firms and workers in the TAW sector increased from 1995 to 2000 and we observe a rising share in overall employment, from 0.5% to 1%. (These figures are a lower bound on the overall number of TAW workers as short spells

are underrepresented because of how the data are collected.) The number of firms, although increasing in absolute numbers, had a share of about 0.1% of all firms in the private sector. (A tabulation of the development over time is given in the Appendix, Table A.1.)

Table 1 provides the descriptive statistics of our estimating sample, by TAW status. On average, TAW workers had a lower wage than other workers, with a mean hourly wage difference of about 23%. We also see that the dispersion of wages is lower for TAW workers, a finding also evident in Figure 1 where we plot the two wage distributions, pooling the observations from the six years. The graph shows that the distribution of wages for TAW workers is more concentrated, with a higher peak and a thinner upper tail.

[Table 1 near here.]

[Figure 1 near here.]

We observe a similar percentage of women in TAW as in other firms in the private sector (about 42%). TAW workers are on average four years younger than workers in the rest of the private sector, who are on average 36 years old. TAW workers are on average slightly better educated than other workers (about 50% of TAW workers have 6 school years or less, compared to 61% in other sectors; nevertheless, there are fewer workers with a higher education diploma in TAW than in other firms, i.e. four vs six percent). There are also more low-skilled and administrative workers in TAW than in other firms. We see that workers in TAW have short tenures with their firms, with 68% of TAW workers having tenures of less than one year; in contrast, for all other workers the fraction of workers who have tenures of less than one year is 18%. The incidence of part-time is higher in TAW than in the rest of the economy (25% vs 9%).

TAW are concentrated in the Lisbon region (78%, as opposed to 42% for the remaining sectors).[7]

For 2000 only, data on the type of contract are available, indicating that 74% of TAW workers have a fixed-term contract, which compares to 15% of the workers in the rest of the private sector.

# 5 Lower pay in TAW?

The comparison of mean wages points to a substantial and significant wage difference between TAW and regular workers, despite the stringent legal requirements. In this section, we investigate in more detail if such wage differences are still evident once we control for the firm and worker characteristics.

Table 2 reports the estimated coefficients (and robust standard errors) of wage regressions where we estimate the hourly wages of workers in the private sector. We use several empirical specifications for men and women who are 16 to 25 years of age and for men and women of ages 26 to 65. (The full estimation results are provided in the Appendix, where we also report estimation results for the complete sample.)

Specification 1 controls for location of the firm and age and education of the workers (and indicators for the year of observation). Specification 2 controls in addition for the workers' occupation, which is one of the following categories: senior managers, professionals or scientists; junior managers; administrative work-

[7] The agencies in Lisbon have on average a larger volume of business than companies in the rest of the economy and the share of the market held by the five largest firms, either in terms of employment or sales volume, has remain stable at about 33% (not shown in the Table). These figures are consistent with those reported in Storrie (2002) and they show Portugal as one of the countries where TAW is least concentrated in Europe; only the UK and Germany have a lower market concentration.

ers; service and sales workers; farmers; skilled workers and craftsmen; machine operators, assembly workers; unskilled workers.

Because workers do not randomly choose to work for a TAW firm, any observed wage difference between TAW and other workers may be caused by personal characteristics not observed by us. We therefore estimate wage regressions where we control for worker unobservable quality by introducing worker fixed effects.[8] The estimated coefficients from these estimations are presented in Columns 3 and 4 of Table 2, where specification 3 (specification 4) has the same set of controls as specification 1 (specification 2).

[Table 2 near here.]

The estimations show that younger women who work for a TAW firm receive a higher wage than similar women who work for other firms. This is supported both by the OLS and the fixed-effects regressions. We estimate that they receive a wage which is about four to five percent higher than that of similar workers in other firms. For younger men, the results are not as pronounced as for young women, as young men earn on average a wage that is about one to two percent higher in TAW than in other firms. All these estimated wage differences are statistically significant at an error level of five percent, or less.

According to the OLS estimates, older women who work in TAW earn about 12 percent less than similar women who work for other firms. This difference is dramatically reduced—to about 1 percent, or less—when we control for unobserved characteristics in the fixed-effects estimates. For prime-age male workers, however, we obtain coefficients that indicate a much more severe difference between working for TAW and other firms. We estimate, controlling for fixed

[8] Identification in this regressions of the impact of education on wages is feasible given that a share of the workforce is observed changing —increasing —its education level. These shares are 2%, 2%, 2%, and 1%, respectively for workers initially observed with 4, 6, 9, and 12 years of education.

characteristics, that these workers earn a wage which is about five percent lower than similar workers (if not controlling for the worker unobservable quality, that penalty would be between 16 and 23 percent).

# 6 Wages before and after working in TAW

We proceed placing the spells of TAW employment in the context of the workers' careers. The wages of those workers who chose to work for a TAW firm could have been deteriorating relative to similar workers prior to entering a TAW firm. This relative wage loss could have been their motivation to start a TAW job. A second issue concerns the workers' careers once they start working for a TAW firm and their wage progression thereafter. Two different hypotheses on the wage development upon entering the sector may be formulated. TAW typically place workers in several firms and this improves their position to finding a good job match, possibly leading to being formally hired by a firm that already hired them through the TAW firm. As such, a worker would have already accumulated some firm-specific human capital and we then expect the worker to have a comparable, if not faster, wage progression than other workers on leaving the TAW firm. Alternatively, working for a TAW might be interpreted as a signal of lower ability by employers and would result in fewer and/or worse job offers than other workers would receive. This kind of mechanism would lead to poorer employment prospects for former TAW workers and their wages would be lower than those of otherwise similar workers.

In the vein of Segal and Sullivan (1998) and Jacobson, LaLonde and Sullivan (1993), we construct a set of dummy variables to capture the number of years before or after the start of the TAW spell. For each worker, the dummy variable

$D_t^k$ is 1 if the worker at time $t$ is $k$ years away from the start of the TAW spell. Because our data cover 6 years, we have allowed $k$ to range between -2 and 2, with a negative (positive) $k$ indicating the time before (after) the start of a spell of TAW employment. If the worker works for an TAW firm at time $t$, the dummy variable $D_t^0$ is equivalent to a dummy variable on TAW work, similar to the one used in the specifications above.[9] We report results including controls for location, age, education and worker fixed effects, and the year of observation (with and without occupation included). For this part of the analysis, we dropped workers who had more than one spell of TAW, which led to an exclusion of seven percent of workers who ever had a TAW spell.

Table 3 reports the estimated coefficients for the indicator variables that control for employment episodes before and after the start of the TAW spell. Focusing on the estimated coefficient on TAW, the estimations confirm the previous results, i.e., young workers earn a higher wage in agencies than their peers. In contrast, older workers earn lower wages in TAW than in other firms, with the difference being smaller for women than for men.

[Table 3 near here.]

Before entering TAW, we observe that there are no differences in terms of wages for young workers between those who started to work in for a TAW firm and those who did not. The motivation to enter TAW seems to be different for younger than for older workers, because we estimate that older workers, both men and women, see their wages deteriorate relative to similar workers before starting to work in a TAW firm, suggesting that adverse labor market conditions may motivate prime-age workers to search for a TAW job.

[9] We have also used dummy variables for the post-TAW wages that indicate the time since the end of the TAW employment. However, since most TAW spells are of a short duration, the interpretation of our findings change little. These results are available at request from the authors.

After the start of the TAW spell, we estimate that young female workers enjoy higher wages than their peers, at least for the two years we are able to investigate, a wage difference of some two to four percent. We do not find this pattern for young male TAW workers. For them, post-TAW wages are not significantly different from similar workers in other sectors, after accounting for worker unobservable quality. Older female workers are estimated to have about one percent lower wages than women who did not work for a TAW firm, but the difference is smaller than in the years before the TAW spell where it amounted to some three percent. Older male TAW workers receive about four percent less than comparable workers before and after their TAW spell.

# 7 Conclusion

Using unique linked employer-employee data from Portugal that cover the entire private sector we investigate whether or not workers in TAW receive a lower wage than workers who work for other firms. Despite the extensive legal protection of TAW workers, we observe a wage difference of about 23% for TAW workers in the raw data. Once we control for standard human capital indicators, the differential is estimated to be 9%. The available data allow a more careful analysis in that we are able to control for unobservable workers' characteristics by using workers' fixed-effects in our estimations. Controlling for this type of factors, the wage penalty of TAW workers is reduced to 1% to 2%, for the overall labor force.

However, interesting differences emerge across groups of workers: young and older, males and females. For young workers, working for a TAW firm results in wages that are higher than in other sectors. The difference is particularly high for women who earn about 4% to 5% higher wages in TAW than elsewhere; for

young men the difference is about 1%. In contrast, for older workers TAW work is associated with a wage penalty, which is larger for males than for females.

The wage developments before starting to work for TAW are clearly different for younger and older workers, which may result in a different motivation to start working for a TAW firm. Before entering a TAW firm, prime-age workers see their wages deteriorate relative to similar workers, suggesting that adverse labor market conditions motivate them to search for a TAW job. For younger workers, we cannot detect any pre-TWA wage trend.

The impact of TAW employment on the subsequent career is different for young and older workers, too. For young females, wages are higher one and two years after starting to work for TAW than for comparable women in other firms. For them, the training, networking or other skills provided by TAW lead to a faster wage growth than for similar workers elsewhere in the economy. For young males, the results do not differ significantly between those who worked for a TAW firm and those who did not. For older workers, we identify once again a detrimental impact of TAW work since after the start of the TAW spell, their wages remain significantly below those of similar workers not in TAW, particularly for males.

The evidence collected lends support to attempts (namely by the European Commission) to safeguard the workers in TAW and their subsequent career progression, in particular for prime-age and older workers. For young workers, the evidence suggests that working for a TAW firm can be an entry gate and stepping stone in the labor market.

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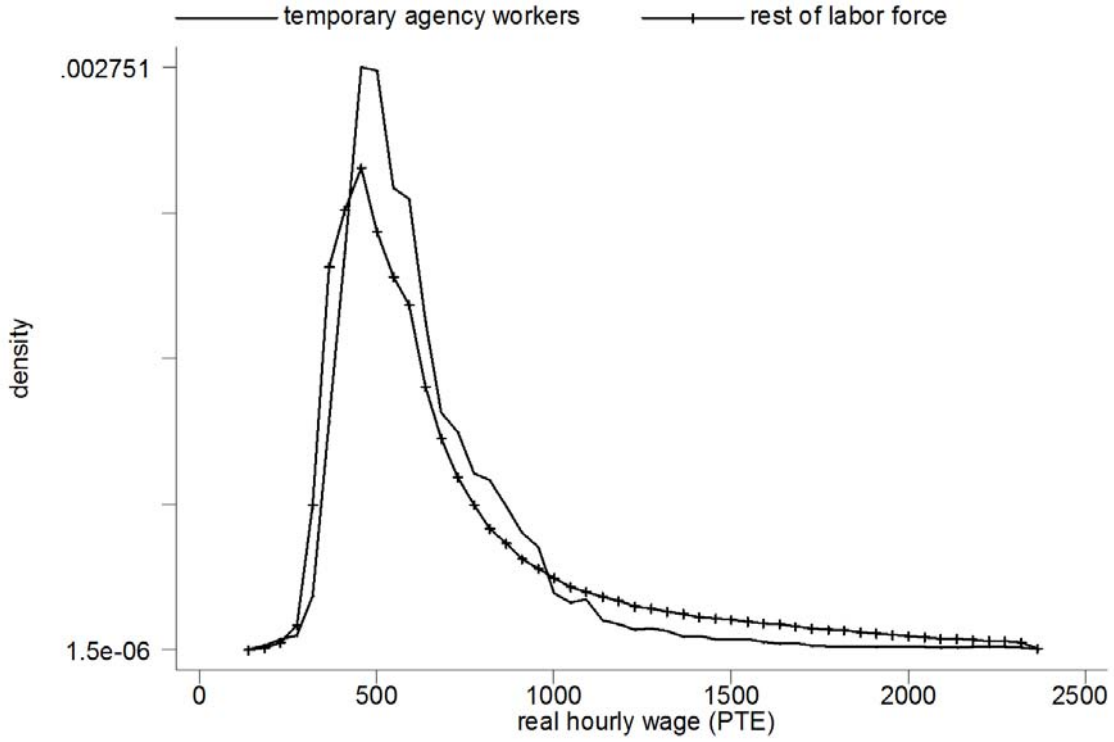
# Figures and Tables

Figure 1: Wage distribution for TAW and other workers, 1995–2000.




*Source*: MTSS, 1995–2000, Portugal, own calculations. Wages above the 99th percentile are not plotted.

Table 1: Descriptive statistics.

| | TAW workers | | "Regular" workers | |
|---|---|---|---|---|
| Variable | Mean | Std. Dev. | Mean | Std. Dev. |
| Hourly wage (log) | 6.416 | (0.390) | 6.519 | (0.563) |
| Hourly wage (PTE) | 673.784 | (458.229) | 831.341 | (829.515) |
| Female | 0.416 | | 0.421 | |
| Lisbon | 0.777 | | 0.418 | |
| *Education* | | | | |
| 4 yrs | 0.304 | | 0.378 | |
| 6 yrs | 0.207 | | 0.232 | |
| 9 yrs | 0.185 | | 0.148 | |
| 12 yrs | 0.253 | | 0.161 | |
| 16 yrs | 0.040 | | 0.061 | |
| Age | 31.514 | (10.383) | 35.879 | (11.142) |
| *Occupation* | | | | |
| profes., scientists | 0.009 | | 0.031 | |
| middle manag. | 0.044 | | 0.097 | |
| administrative workers | 0.257 | | 0.159 | |
| service and sales workers | 0.104 | | 0.134 | |
| farmers | 0.005 | | 0.003 | |
| skilled workers and craftsmen | 0.275 | | 0.266 | |
| machine operators, assembly workers | 0.100 | | 0.132 | |
| unskilled workers | 0.198 | | 0.153 | |
| Tenure | | | | |
| $<$ 1 year | 0.680 | | 0.177 | |
| $1\leq$ tenure$<$ 2 years | 0.125 | | 0.115 | |
| $2\leq$ tenure$<$ 3 years | 0.052 | | 0.083 | |
| Part-time | 0.246 | | 0.085 | |
| | | | | |
| *Available for 2000 only:* | | | | |
| Fixed-term contract | 0.736 | | 0.145 | |
| N | 83022 | | 1074162 | |

Table 2: Estimated wage differences for TAW and regular workers.

| | OLS | | Fixed-effects | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Coefficient | Coefficient | Coefficient | Coefficient |
| | (SE) | (SE) | (SE) | (SE) |
| *16–25 years of age* | | | | |
| Women | .077 | .052 | .050 | .039 |
| | (.003)*** | (.003)*** | (.005)*** | (.006)*** |
| Obs. | 118914 | 103076 | 118914 | 103076 |
| Men | .027 | .021 | .019 | .013 |
| | (.003)*** | (.003)*** | (.005)*** | (.006)** |
| Obs. | 134774 | 112916 | 134774 | 112916 |
| *26–65 years of age* | | | | |
| Women | -.135 | -.118 | -.006 | -.010 |
| | (.003)*** | (.003)*** | (.004)* | (.004)** |
| Obs. | 367492 | 346779 | 367492 | 346779 |
| Men | -.226 | -.164 | -.058 | -.054 |
| | (.003)*** | (.003)*** | (.004)*** | (.004)*** |
| Obs. | 536004 | 512917 | 536004 | 512917 |

Note: Specifications 1 and 2 are based on pooled OLS wage regressions and specifications 3 and 4 are fixed-effects panel wage regressions. All specifications control for location of the firm, age and education of the workers, and the year of observation. Specifications 2 and 4 control in addition for the workers' occupation. The full set of estimation results are provided in the Appendix. Robust standard errors. Estimations based on MTSS, 1995-2000, Portugal. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%.

Table 3: Estimated wage differences before and after start of TAW work.

| | Age: 16–25 | | | | Age: 26–65 | | | |
|---|---|---|---|---|---|---|---|---|
| | Women | | Men | | Women | | Men | |
| | Coefficient (SE) | Coefficient (SE) | Coefficient (SE) | Coefficient (SE) | Coefficient (SE) | Coefficient (SE) | Coefficient (SE) | Coefficient (SE) |
| 2 yrs before start TAW spell | -.008 (.011) | -.005 (.013) | .001 (.010) | .005 (.012) | -.032 (.008)*** | -.031 (.008)*** | -.008 (.007) | -.006 (.007) |
| 1 yr before start TAW spell | -.017 (.011) | -.013 (.013) | -.013 (.011) | -.010 (.012) | -.037 (.008)*** | -.029 (.009)*** | -.038 (.008)*** | -.037 (.008)*** |
| TAW work | .059 (.008)*** | .053 (.009)*** | .028 (.008)*** | .022 (.009)** | -.014 (.005)*** | -.014 (.005)*** | -.065 (.005)*** | -.059 (.005)*** |
| 1 yr after start of TAW spell | .034 (.009)*** | .036 (.010)*** | .023 (.009)*** | .012 (.010) | -.009 (.005)* | -.007 (.005) | -.035 (.005)*** | -.036 (.006)*** |
| 2 yrs after start of TAW spell | .015 (.010) | .017 (.010)* | -.001 (.009) | -.005 (.010) | -.013 (.005)** | -.013 (.006)** | -.037 (.006)*** | -.037 (.006)*** |
| Occupation | — | yes | — | yes | — | yes | — | yes |
| Obs. | 117732 | 102058 | 133097 | 111502 | 364573 | 344148 | 530175 | 507626 |
| Adjusted $R^2$ | .675 | .683 | .646 | .655 | .873 | .876 | .873 | .874 |

Note: All specifications control for location of the firm, age, education and worker fixed effects, and the year of observation. The full set of estimation results are provided in the Appendix. Robust standard errors. Estimations based on MTSS, 1995-2000, Portugal. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%.

# Appendix

Table A.1: TAW and workers in Portugal, 1995–2000.

| | Firms | Workers |
|---|---|---|
| | (percent of all private sector) | |
| 1995 | 148 | 7,637 |
| | (0.10) | (0.46) |
| 1996 | 158 | 9,415 |
| | (0.10) | (0.57) |
| 1997 | 184 | 13,072 |
| | (0.11) | (0.74) |
| 1998 | 203 | 15,634 |
| | (0.11) | (0.86) |
| 1999 | 223 | 17,179 |
| | (0.11) | (0.89) |
| 2000 | 243 | 20,085 |
| | (0.11) | (1.00) |

Note: Own calculations based on MTSS, 1995-2000, Portugal.

Table A.2: Wage regressions, all workers.

| | (1) Coefficient (SE) | (2) Coefficient (SE) | (3) Coefficient (SE) | (4) Coefficient (SE) |
|---|---|---|---|---|
| TAW work | -.122 (.001)*** | -.097 (.002)*** | -.012 (.002)*** | -.016 (.002)*** |
| Lisbon | .164 (.0008)*** | .165 (.0008)*** | .039 (.002)*** | .040 (.002)*** |
| Female | -.241 (.0008)*** | -.207 (.0008)*** | — | — |
| Educ: 4 yrs. | .115 (.002)*** | .073 (.002)*** | -.035 (.010)*** | -.039 (.010)*** |
| Educ: 6 yrs. | .281 (.003)*** | .190 (.003)*** | -.035 (.010)*** | -.043 (.011)*** |
| Educ: 9 yrs. | .478 (.003)*** | .313 (.003)*** | -.019 (.011)* | -.031 (.011)*** |
| Educ: 12 yrs. | .650 (.003)*** | .398 (.003)*** | .006 (.011) | -.004 (.011) |
| Educ: 16 yrs. | 1.272 (.003)*** | .766 (.004)*** | .156 (.013)*** | .132 (.014)*** |
| Age | .050 (.0002)*** | .039 (.0002)*** | .080 (.0006)*** | .072 (.0006)*** |
| Age sq. | -.0004 (2.97e-06)*** | -.0003 (2.96e-06)*** | -.0005 (7.30e-06)*** | -.0005 (7.70e-06)*** |
| Const. | 4.999 (.005)*** | 5.927 (.007)*** | 4.410 (.015)*** | 4.678 (.017)*** |
| Occupation (8 dummies) | — | yes | — | yes |
| Worker fixed effects | — | — | yes | yes |
| Obs. | 1157184 | 1075688 | 1157184 | 1075688 |
| $R^2$ | .457 | .516 | .858 | .862 |

Note: Adjusted $R^2$ reported for the fixed-effects regressions. Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation. Estimations based on MTSS, 1995-2000, Portugal.

Table A.3: Wage regressions, women 16–25.

| | (1) Coefficient (SE) | (2) Coefficient (SE) | (3) Coefficient (SE) | (4) Coefficient (SE) |
|---|---|---|---|---|
| TAW work | .077 (.003)*** | .052 (.003)*** | .050 (.005)*** | .039 (.006)*** |
| Lisbon | .108 (.002)*** | .109 (.002)*** | .019 (.007)*** | .022 (.008)*** |
| Educ: 4 yrs. | -.00008 (.016) | -.010 (.018) | -.167 (.110) | -.226 (.122)* |
| Educ: 6 yrs. | .052 (.016)*** | .036 (.018)** | -.153 (.108) | -.220 (.120)* |
| Educ: 9 yrs. | .129 (.016)*** | .095 (.018)*** | -.146 (.107) | -.217 (.120)* |
| Educ: 12 yrs. | .263 (.016)*** | .190 (.018)*** | -.118 (.108) | -.185 (.120) |
| Educ: 16 yrs. | .718 (.017)*** | .508 (.019)*** | .036 (.109) | -.057 (.122) |
| Age | .053 (.007)*** | .012 (.008) | .141 (.009)*** | .075 (.011)*** |
| Age sq. | -.0006 (.0002)*** | .0002 (.0002) | -.002 (.0002)*** | -.0005 (.0003)** |
| Const. | 5.096 (.074)*** | 5.965 (.089)*** | 4.165 (.150)*** | 5.129 (.179)*** |
| Occupation (8 dummies) | — | yes | — | yes |
| Worker fixed effects | — | — | yes | yes |
| Obs. | 118914 | 103076 | 118914 | 103076 |
| $R^2$ | .34 | .374 | .673 | .681 |

Note: Adjusted $R^2$ reported for the fixed-effects regressions. Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation. Estimations based on MTSS, 1995-2000, Portugal.

Table A.4: Wage regressions, men 16–25.

| | (1) Coefficient (SE) | (2) Coefficient (SE) | (3) Coefficient (SE) | (4) Coefficient (SE) |
|---|---|---|---|---|
| TAW work | .027 (.003)*** | .021 (.003)*** | .019 (.005)*** | .013 (.006)** |
| Lisbon | .124 (.002)*** | .123 (.002)*** | .046 (.007)*** | .050 (.008)*** |
| Educ: 4 yrs. | .020 (.011)* | .015 (.012) | -.009 (.034) | -.018 (.041) |
| Educ: 6 yrs. | .069 (.010)*** | .059 (.011)*** | -.004 (.034) | -.017 (.041) |
| Educ: 9 yrs. | .140 (.011)*** | .120 (.012)*** | .021 (.034) | .013 (.042) |
| Educ: 12 yrs. | .254 (.011)*** | .199 (.012)*** | .044 (.035) | .038 (.043) |
| Educ: 16 yrs. | .728 (.013)*** | .512 (.015)*** | .190 (.042)*** | .158 (.049)*** |
| Age | .131 (.007)*** | .079 (.008)*** | .220 (.009)*** | .142 (.012)*** |
| Age sq. | -.002 (.0002)*** | -.001 (.0002)*** | -.003 (.0002)*** | -.002 (.0003)*** |
| Const. | 4.213 (.074)*** | 5.152 (.090)*** | 3.057 (.108)*** | 4.141 (.145)*** |
| Occupation (8 dummies) | — | yes | — | yes |
| Worker fixed effects | — | — | yes | yes |
| Obs. | 134774 | 112916 | 134774 | 112916 |
| $R^2$ | .28 | .301 | .642 | .652 |

Note: Adjusted $R^2$ reported for the fixed-effects regressions. Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation. Estimations based on MTSS, 1995-2000, Portugal.

Table A.5: Wage regression, women 26–65.

| | (1) Coefficient (SE) | (2) Coefficient (SE) | (3) Coefficient (SE) | (4) Coefficient (SE) |
|---|---|---|---|---|
| TAW work | -.135 (.003)*** | -.118 (.003)*** | -.006 (.004)* | -.010 (.004)** |
| Lisbon | .153 (.001)*** | .149 (.001)*** | .032 (.004)*** | .031 (.004)*** |
| Educ: 4 yrs. | .054 (.004)*** | .025 (.004)*** | -.021 (.015) | -.021 (.015) |
| Educ: 6 yrs. | .205 (.004)*** | .125 (.004)*** | -.022 (.016) | -.025 (.016) |
| Educ: 9 yrs. | .454 (.004)*** | .263 (.004)*** | -.020 (.016) | -.020 (.017) |
| Educ: 12 yrs. | .638 (.004)*** | .348 (.005)*** | .003 (.017) | .007 (.018) |
| Educ: 16 yrs. | 1.250 (.005)*** | .703 (.006)*** | .100 (.022)*** | .097 (.023)*** |
| Age | .049 (.0006)*** | .039 (.0006)*** | .058 (.001)*** | .057 (.001)*** |
| Age sq. | -.0005 (7.44e-06)*** | -.0004 (7.15e-06)*** | -.0003 (.00002)*** | -.0003 (.00002)*** |
| Const. | 4.837 (.013)*** | 5.784 (.015)*** | 4.682 (.029)*** | 4.810 (.031)*** |
| Occupation (8 dummies) | — | yes | — | yes |
| Worker fixed effects | — | — | yes | yes |
| Obs. | 367492 | 346779 | 367492 | 346779 |
| $R^2$ | .451 | .528 | .872 | .875 |

Note: Adjusted $R^2$ reported for the fixed-effects regressions. Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation. Estimations based on MTSS, 1995-2000, Portugal.

Table A.6: Wage regression, men 26–65.

| | (1) Coefficient (SE) | (2) Coefficient (SE) | (3) Coefficient (SE) | (4) Coefficient (SE) |
|---|---|---|---|---|
| TAW work | -.226 (.003)*** | -.164 (.003)*** | -.058 (.004)*** | -.054 (.004)*** |
| Lisbon | .191 (.001)*** | .188 (.001)*** | .035 (.004)*** | .040 (.004)*** |
| Educ: 4 yrs. | .147 (.003)*** | .087 (.003)*** | -.039 (.014)*** | -.043 (.014)*** |
| Educ: 6 yrs. | .319 (.004)*** | .206 (.004)*** | -.044 (.014)*** | -.048 (.015)*** |
| Educ: 9 yrs. | .561 (.004)*** | .348 (.004)*** | -.041 (.015)*** | -.048 (.016)*** |
| Educ: 12 yrs. | .759 (.004)*** | .459 (.004)*** | -.022 (.016) | -.028 (.017)* |
| Educ: 16 yrs. | 1.369 (.005)*** | .849 (.006)*** | .123 (.021)*** | .105 (.022)*** |
| Age | .066 (.0005)*** | .054 (.0005)*** | .068 (.001)*** | .065 (.001)*** |
| Age sq. | -.0006 (6.21e-06)*** | -.0005 (5.94e-06)*** | -.0004 (1.00e-05)*** | -.0004 (1.00e-05)*** |
| Const. | 4.591 (.011)*** | 5.546 (.012)*** | 4.635 (.026)*** | 4.783 (.028)*** |
| Occupation (8 dummies) | — | yes | — | yes |
| Worker fixed effects | — | — | yes | yes |
| Obs. | 536004 | 512917 | 536004 | 512917 |
| $R^2$ | .422 | .488 | .870 | .872 |

Note: Adjusted $R^2$ reported for the fixed-effects regressions. Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation. Estimations based on MTSS, 1995-2000, Portugal.

Table A.7: Wage regression with additional regressors, all workers.

| | (1)<br>Coefficient<br>(SE) | (2)<br>Coefficient<br>(SE) |
|---|---|---|
| 2 yrs before start TAW spell | -.018<br>(.004)*** | -.014<br>(.004)*** |
| 1 yr before start TAW spell | -.038<br>(.004)*** | -.034<br>(.004)*** |
| Year of start of TAW spell | -.017<br>(.003)*** | -.019<br>(.003)*** |
| 1 yr after start of TAW spell | -.008<br>(.003)*** | -.010<br>(.003)*** |
| 2 yrs after start of TAW spell | -.016<br>(.003)*** | -.016<br>(.003)*** |
| Lisbon | .039<br>(.002)*** | .040<br>(.003)*** |
| Educ: 4 yrs. | -.034<br>(.010)*** | -.036<br>(.010)*** |
| Educ: 6 yrs. | -.035<br>(.010)*** | -.042<br>(.011)*** |
| Educ: 9 yrs. | -.018<br>(.011)* | -.029<br>(.011)*** |
| Educ: 12 yrs. | .007<br>(.011) | -.001<br>(.011) |
| Educ: 16 yrs. | .158<br>(.013)*** | .135<br>(.014)*** |
| Age | .080<br>(.0006)*** | .073<br>(.0006)*** |
| Age sq. | -.0005<br>(7.32e-06)*** | -.0005<br>(7.72e-06)*** |
| Const. | 4.407<br>(.015)*** | 4.669<br>(.017)*** |
| Occupation (8 dummies) | — | yes |
| Obs. | 1145577 | 1065334 |
| Adjusted $R^2$ | .860 | .864 |

Note: Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation and worker fixed effects. Estimations based on MTSS, 1995-2000, Portugal.

Table A.8: Wage regression with additional regressors, women 16–25.

| | (1)<br>Coefficient<br>(SE) | (2)<br>Coefficient<br>(SE) |
|---|---|---|
| 2 yrs before start TAW spell | -.008<br>(.011) | -.005<br>(.013) |
| 1 yr before start TAW spell | -.017<br>(.011) | -.013<br>(.013) |
| Year of start of TAW spell | .059<br>(.008)*** | .053<br>(.009)*** |
| 1 yr after start of TAW spell | .034<br>(.009)*** | .036<br>(.010)*** |
| 2 yrs after start of TAW spell | .015<br>(.010) | .017<br>(.010)* |
| Lisbon | .019<br>(.007)*** | .022<br>(.008)*** |
| Educ: 4 yrs. | -.169<br>(.111) | -.227<br>(.123)* |
| Educ: 6 yrs. | -.157<br>(.108) | -.224<br>(.120)* |
| Educ: 9 yrs. | -.152<br>(.108) | -.222<br>(.120)* |
| Educ: 12 yrs. | -.124<br>(.108) | -.189<br>(.121) |
| Educ: 16 yrs. | .030<br>(.109) | -.059<br>(.122) |
| Age | .141<br>(.009)*** | .074<br>(.011)*** |
| Age sq. | -.002<br>(.0002)*** | -.0005<br>(.0003)* |
| Const. | 4.171<br>(.150)*** | 5.138<br>(.179)*** |
| Occupation (8 dummies) | — | yes |
| Obs. | 117732 | 102058 |
| Adjusted $R^2$ | .675 | .683 |

Note: Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation and worker fixed effects. Estimations based on MTSS, 1995-2000, Portugal.

Table A.9: Wage regression with additional regressors, men 16–25.

| | (1) Coefficient (SE) | (2) Coefficient (SE) |
|---|---|---|
| 2 yrs before start TAW spell | .001 (.010) | .005 (.012) |
| 1 yr before start TAW spell | -.013 (.011) | -.010 (.012) |
| Year of start of TAW spell | .028 (.008)*** | .022 (.009)** |
| 1 yr after start of TAW spell | .023 (.009)*** | .012 (.010) |
| 2 yrs after start of TAW spell | -.001 (.009) | -.005 (.010) |
| Lisbon | .047 (.007)*** | .050 (.008)*** |
| Educ: 4 yrs. | -.009 (.034) | -.018 (.042) |
| Educ: 6 yrs. | -.006 (.034) | -.019 (.042) |
| Educ: 9 yrs. | .019 (.035) | .013 (.042) |
| Educ: 12 yrs. | .043 (.036) | .038 (.043) |
| Educ: 16 yrs. | .189 (.043)*** | .160 (.050)*** |
| Age | .219 (.010)*** | .141 (.012)*** |
| Age sq. | -.003 (.0002)*** | -.002 (.0003)*** |
| Const. | 3.069 (.109)*** | 4.151 (.146)*** |
| Occupation (8 dummies) | — | yes |
| Obs. | 133097 | 111502 |
| Adjusted $R^2$ | .646 | .655 |

Note: Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation and worker fixed effects. Estimations based on MTSS, 1995-2000, Portugal.

Table A.10: Wage regression with additional regressors, women 26–65.

| | (1) Coefficient (SE) | (2) Coefficient (SE) |
|---|---|---|
| 2 yrs before start TAW spell | -.032 (.008)*** | -.031 (.008)*** |
| 1 yr before start TAW spell | -.037 (.008)*** | -.029 (.009)*** |
| Year of start of TAW spell | -.014 (.005)*** | -.014 (.005)*** |
| 1 yr after start of TAW spell | -.009 (.005)* | -.007 (.005) |
| 2 yrs after start of TAW spell | -.013 (.005)** | -.013 (.006)** |
| Lisbon | .031 (.004)*** | .029 (.004)*** |
| Educ: 4 yrs. | -.020 (.015) | -.021 (.015) |
| Educ: 6 yrs. | -.022 (.016) | -.025 (.016) |
| Educ: 9 yrs. | -.022 (.016) | -.022 (.017) |
| Educ: 12 yrs. | .001 (.017) | .005 (.018) |
| Educ: 16 yrs. | .098 (.022)*** | .094 (.023)*** |
| Age | .058 (.001)*** | .057 (.001)*** |
| Age sq. | -.0003 (.00002)*** | -.0003 (.00002)*** |
| Const. | 4.695 (.029)*** | 4.815 (.031)*** |
| Occupation (8 dummies) | — | yes |
| Obs. | 364573 | 344148 |
| Adjusted $R^2$ | .873 | .876 |

Note: Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation and worker fixed effects. Estimations based on MTSS, 1995-2000, Portugal.

Table A.11: Wage Regression with additional regressors, men 26–65.

| | (1) Coefficient (SE) | (2) Coefficient (SE) |
|---|---|---|
| 2 yrs before start TAW spell | -.008 (.007) | -.006 (.007) |
| 1 yr before start TAW spell | -.038 (.008)*** | -.037 (.008)*** |
| Year of start of TAW spell | -.065 (.005)*** | -.059 (.005)*** |
| 1 yr after start of TAW spell | -.035 (.005)*** | -.036 (.006)*** |
| 2 yrs after start of TAW spell | -.037 (.006)*** | -.037 (.006)*** |
| Lisbon | .035 (.004)*** | .040 (.004)*** |
| Educ: 4 yrs. | -.041 (.014)*** | -.042 (.014)*** |
| Educ: 6 yrs. | -.046 (.014)*** | -.047 (.015)*** |
| Educ: 9 yrs. | -.040 (.015)*** | -.045 (.016)*** |
| Educ: 12 yrs. | -.021 (.016) | -.025 (.017) |
| Educ: 16 yrs. | .126 (.022)*** | .110 (.022)*** |
| Age | .068 (.001)*** | .066 (.001)*** |
| Age sq. | -.0004 (1.00e-05)*** | -.0004 (1.00e-05)*** |
| Const. | 4.629 (.026)*** | 4.772 (.028)*** |
| Occupation (8 dummies) | — | yes |
| Obs. | 530175 | 507626 |
| Adjusted $R^2$ | .873 | .874 |

Note: Robust standard errors in parenthesis. Asterisks indicate statistical significance at the following levels: *** 1%; ** 5%; * 10%. All regressions control for year of observation and worker fixed effects. Estimations based on MTSS, 1995-2000, Portugal.