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MINIMUM WAGE AND JOB MOBILITY IN PERU

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Minimum Wage and Job Mobility*

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Resumen

Se estudia los efectos de cambios en el salario mínimo utilizando una base de datos que registra 7 cambios consecutivos de este indicador (entre 2002 y 2011). Se estima que 1 *millón de trabajadores tienen ingresos en la vecindad del salario mínimo. Los efectos sobre el empleo son decrecientes en términos absolutos según tamaño de empresa: efecto moderado en empresas grandes y efectos mayores en empresas pequeñas. Finalmente, se sugiere que los cambios en el ingreso están correlacionados con los cambios en el salario mínimo, este resultado se sustenta en los movimientos de la distribución del ingreso ante cambios en el salario mínimo y según un modelo que captura los determinantes del ingreso. Los resultados son robustos a la alta rotación del mercado laboral peruano, es decir al considerar las transiciones empleo - empleo en los cálculos.*

Abstract

We study the effects of the minimum wage in over employment and income by considering a monthly database that captures seven minimum wage changes registered between 2002 and 2011. We estimate that about 1 million workers have an income by main occupation in the neighbourhood of the minimum wage. We found that the minimum wage-income elasticity is statistically significant; the evidence also suggests that those who receive low incomes and those working in small businesses are the most affected by increases in the minimum wage. Employment effects are monotonically decreasing in absolute terms by firm size: moderate in big firms and higher in small firms. Results are robust when assessing the job-to-job transitions. Finally, we present evidence that supports the

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hypothesis that the minimum wage in Peru is correlated with income. The movement of income distribution in the context of changes in the minimum wage as well as the results provided by a model that captures the drivers of income justify this result.

JEL Classification: E24, E26, J20, J21, J61.
Keywords: Minimum wage, Labor mobility, Income dynamics, Informality.

1 Introduction

The minimum wage in Peru was first introduced in 1962.[1] It has gone under different denominations throughout time. Currently, it is called minimum living wage (*remuneración mínima vital*, RMV). The study of the dynamic effects of the minimum wage in the context of the Peruvian economy is of great interest since this country has experienced a remarkable transformation during the last two decades, including a period of persistent economic growth (5.5% of average yearly GDP growth during the first decade of 2000). The minimum wage has been raised several times in the last ten years. It is ambiguous what the impact of these policies has been, because of the bonanza experienced by the country –which might facilitate the absorption of increases in the minimum wage– and because of the inherent difficulties in the enforcement of these regulatory changes in the context of a labour market that is still predominantly informal.

In this paper, we revisit the impact of the minimum wage in the Peruvian labor market (Chacaltana (2006); Céspedes (2006); Jaramillo and López (2006); Jaramillo (2012); Del Valle (2009)). We differentiate ourselves from the previous literature in three aspects. First, we will track all the modifications in the minimum wage observed throughout the last decade to identify our results. Second, we will look at the impact on a range of outcomes, including employment status, job mobility, informality and the income of workers. Third, we will calculate not only short-run effects but also longer-run effects.

Specifically, we will analyze seven changes in the minimum wage from 2003 to 2011 by using a comparable database that records the working status of workers as well as the duration of employment and unemployment in the context of changes in the minimum wage. We provide an identification strategy that allows capturing the changes in the employment status as well as the income of workers who are directly

[1] Source: Peru National Bureau of Statistics.

affected by changes in the minimum wages. This identification is based on the employment status of a panel of workers as well as their duration of employment and unemployment.[2] The methodology also provides some evidence of the indirect effects of the minimum wage on both employment status and income. Summing up, by using a comparable database and also using our identification strategy, we are able to perform a comprehensive evaluation of the various effects of the changes in minimum wage over employment, informality, and the workers income.

We aim to provide answers to the following relevant questions: are changes in the minimum wage important in the job market (in terms of employment and income)? Has its importance changed throughout the last decade? How significant is the minimum wage in terms of job mobility? Does the minimum wage foster informality? As we mentioned before, the available studies cover specific periods during a decade. They also cover a relevant database to identify the effects of the minimum wage and see if their importance has changed throughout the last decade of study.

According to the EPE (*Encuesta Permanente de Empleo*), around 20% of employed workers register job-to-job transitions towards a quarter, after having experienced short spells of unemployment or short spells of inactivity (out of the labour market) within a quarter. Therefore, we identify the effects of the minimum wage on employment status (or income) within a quarter when we take into account job mobility. One interesting issue that is of interest in the context of the Peruvian economy is related to the relationship between minimum wage and labour informality. Our procedure is able to capture this: those who change jobs induced by the change in the minimum wage can move from formal to informal job within a quarter. If this change is statistically significant we will be able to suggest that the minimum wage fosters informality in the labour market. In the same manner, we study the heterogeneous effects in the changes in the minimum wage according to the size of the company and different categories in the job market.

[2]In order to identify the effects of the minimum wage on employment we need to observe whether the employed workers are still employed after the change in the minimum wage. The database that captures this effect is the EPE (*Encuesta Permanente de Empleo*). This survey registers the employment status of a group of workers twice, two monthly based observations with a 3-month lag. By using the duration of employment we can identify if the workers do not experience job-to-job transitions. By using this database, once the minimum wage changes we can observe the employment status of the workers after three months. This data covers only the Lima Metropolitan area, which can be a limitation since it represents only 30% of the population. The data that covers Peru is the ENAHO (*Encuesta Nacional de Hogares*). However, this database only has yearly base panel observations that may not be proper to capture the short term effects of minimum wage changes. The EPE allows us to capture both short term and long term effects of the minimum wage changes.

We estimate that about 1 million workers have an income by main occupation in the neighbourhood of the minimum wage, with a greater participation in some sectors and/or job categories (textiles, manufacturing, construction, trade, house workers, etc.). We found that minimum wage changes have statistically significant effects on employment and income. These results are robust after controlling for observable micro heterogeneity, aggregate macro variables and seasonality of employment and income. Our procedure also allows identifying the heterogeneous effect of minimum wage changes according to firm size, employment status and income ranges.

This document is divided in 7 sections, including this introduction. Section 2 presents a brief discussion of the international evidence as well as of the evidence available for Peru. Section 3 presents the data used in the formal estimation and the motivation of the study. Section 4 shows the descriptive statistics. Section 5 illustrates the effects of minimum wage over income and/or salaries. Section 6 is dedicated to the study of the effects of the minimum wage on employment. Section 7 summarizes the main results.

2 Literature review

The minimum wage literature is abundant worldwide. One of the first to study the subject is Stigler (1946), who discusses the potential impact of increasing the post war U.S. minimum wage on labor market outcomes as well as on welfare measures. Brown,Gilroy and Kohen (1982) provides a survey of the early literature. Flinn (2011) presents a synthesis of more recent contributions from a methodological perspective. Among the most representative empirical studies are Card and Krueger (1994); Pereira (2003); Bell (1997); Campolieti et al. (2005); Dinardo et al. (1996); Meyer and Wise (1983a);Meyer and Wise (1983b); Brown,Gilroy and Kohen (1982); Neumark and Wascher (1992); Eckstein and Wolpin (1990) and Van den Berg and Ridder (1998).

Prior to the 90s, most of the empirical evidence suggested that increases in the minimum wage were harmful for employment. This is the expected outcome in a competitive labor market. For the U.S., focusing on the segment of the population that earns the minimum wage (teenagers and young adults) Brown,Gilroy and Kohen (1982) present a synthesis of early studies based on time-series analysis. They conclude that for workers around 16-19 years, a 10 percent increase in the minimum wage tends to reduce employment by 1 to 3 percent (elasticity between -0.1 and -0.3). The elasticity for workers around 20-24 years was found to be considerably smaller. Meyer

and Wise (1983a) reach a similar conclusion using micro-level data. In the early 90s, this evidence was contested in a series of studies summarized in Card and Krueger (1995) and best exemplified in the case study of the fast-food industry in New Jersey and Pennsylvania (Card and Krueger, 1994). In this case, the authors were not able to detect a negative effect of a marginal increase in minimum wages on employment. Moreover, Katz and Krueger (1992) detected a positive effect on employment for this industry. For similar evidence, see also Card (1992a).

A positive effect or a non-effect on employment is theoretically possible in the context of firms with monopsony power. For instance, Van den Berg (2003) argues that if firms have monopsony power and there are job search frictions, firms can pay wages that are below the productivity level of the workers because it takes time for them to find a better paying job. Under those circumstances, the adoption of a (or an increase in the) minimum wage reduces the degree to which employers can exploit their monopsony power without necessarily harming employment. Flinn (2011) reaches a similar conclusion. While the evidence collected by Card and Krueger (1995) has been influential and their results can be reconciled with theory, in a review of 102 studies published between 1990 and 2006, the so called "new minimum wage research , Neumark and Wascher (2006) note that in about two thirds of the studies the traditional result of a negative effect on employment is still found. For instance, Neumark and Wascher (2006) exploit variation across states and over time in the U.S. to find elasticities that corroborate the findings obtained by Brown,Gilroy and Kohen (1982). Pereira (2003) uses micro-level data and a quasi-experimental setting for Portugal. She finds that, for workers around 18-19 years, the elasticity is between -0.2 and -0.4. Also exploiting a quasi-experimental setting, Orazem and Mattila (2002) obtain elasticities between -0.06 and -0.12 for all workers and much larger (between -0.31 and -0.85) for low-wage employees.

Overall, two aspects can be established from looking at the international literature. First, most of the evidence seems to be consistent with the prediction that increases in minimum wages lead to reductions in employment among the segment of the population that earns a salary close to the minimum wage. Second, there is awareness that the specific effect of an increase in the minimum wage depends on the context. For instance, the magnitude of the elasticity might vary according to the point in the economic cycle that the country is facing or according to the proportion of the labor force that earns an income close to the minimum wage.

The effects of the minimum wage in the Peruvian labor market have been analyzed

using a variety of empirical methods. A key aspect to bear in mind is that in Peru there is a high concentration of workers whose earnings are located in the neighbourhood of the minimum wage, so studies do not need to focus exclusively on the population of teenager and young adults.[3] Chacaltana (2006) provides a survey that includes Céspedes (2006), Jaramillo and López (2006) and Del Valle (2009). Céspedes uses aggregated monthly employment data from the EPE and applies dynamic panel data techniques to calculate the average impact of the minimum wage over employment exploiting the changes observed between 1997 and 2003. Jaramillo and López (2006) use individual-level data from the EPE to study the impact of the change in the minimum wage observed in 2003. They estimate a linear probability model of employment status conditional on having been employed three months ago. The estimation controls for individual characteristics, firm characteristics, month fixed effects and quarterly GDP growth. In the case of Del Valle, she uses the same database and implements a difference-in-difference analysis of the changes observed in the minimum wage in 2003 and 2006, using the changes observed in year of no change as counterfactual.

Although the three studies mentioned above use different techniques, they reach a qualitatively similar result: increases in the minimum wage lead to reductions in average employment levels. Céspedes estimates an average elasticity of -0.13, whereas Del Valle and Jaramillo and López obtain a larger average elasticity (around -0.75 in both cases). Both Del Valle and Jaramillo and López allow in their estimation for heterogeneous effects according to the position of the individual in the wage distribution prior to the policy change. Del Valle finds that the increase in the minimum wage has a larger effect on those that earn below or around the minimum wage, whereas in Jaramillo and López (2006) the effect is larger on those who earn around or above the minimum wage.

One limitation of Del Valle and Jaramillo and López is that in both cases the empirical identification relies on only one change in the minimum wage.[4] However, there have been several changes in the minimum wage in the last decade. Since there have also been a persistent economic growth during the same time period, it is unclear whether previous results are consistent. Another aspect to bear in mind is that these studies look only at the short-run impact of the change in the minimum wage. Specifically, they only consider as treated (affected by the policy change) those individuals

[3] Approximately 1 million workers may be exposed to minimum wage changes in Lima Metropolitan Area, in the sense that their income is in the neighbourhood of the minimum wage. Section 2.1 characterizes the minimum wage workers in detail.

[4] Del Valle performs separate estimations for 2003 and 2006.

that are observed before and after a change in the minimum wage. However, it is possible that other individuals are affected a few months after the change took place. This is the case of people that have temporary contracts that cannot be fired in the very short-run but that eventually might not have their contracts renewed.

In a recent study, Jaramillo (2012) updates Jaramillo and López (2006) to simultaneously account for the changes observed in 2003, 2006, 2007 and 2010. Interestingly, in this case the nature of the conclusions changes. According to the author, increases in the minimum wage are found to increase employment for a segment of the informal workers (those that earn slightly above the minimum wage) and to have no effect on formal workers. Given that the sample is composed of workers that had a job the previous quarter, what this suggests is that those that had an informal job in one quarter were less likely to lose this employment status in the next quarter if an increase in the minimum wage was observed. One possibility is that these results could be telling something about the impact of changes in the minimum wage over job mobility (transitions from the formal to the informal sector and vice versa).

The literature in Peru has also provided evidence of the effects of the changes in minimum wage over earnings outcomes. Minimum wage changes can affect the income distribution by directly affecting the income of formal workers and by indirectly affecting the income of informal workers. This is the so called lighthouse effect, which seems to be relevant in several studies worldwide. For Latin America, see Kristensen and Cunningham (2006). For Peru, the relationship between income and minimum wage was studied by Yamada and Bazan (1994), Jaramillo and López (2006), Jaramillo (2012), Céspedes (2006), among others. However, as in the previous case these studies base their identification in one specific increase in the minimum wage observed in 2003. The exceptions are Yamada and Bazan (1994) and Céspedes (2006)[5], who use a time-series econometric approach.

3 The data

The data comes from the EPE, which is done on a monthly basis by the Peru National Bureau of Statistics (Instituto Nacional de Estadística e Informática in Spanish, INEI). The EPE is a survey specially conceived to trace labor market related aspects in Lima Metropolitan Area. This geographic area comprehends 43 districts in the Province of

[5]Card and Kruger (1995) argued that time series analyses performed at the macro level may not capture the distributional effects of maximum wage changes.

Lima and 6 districts in the Constitutional Province of Callao.

One of the main characteristic of this survey is that individuals who are interviewed each month include a share of the sample (panel) who was interviewed three months ago. The panel sample rotates partially each quarter in such a way that individuals in the panel sample are interviewed twice in two consecutive quarters. In this paper, we build a sequence of the quarterly unbalanced panel samples, from the first quarter of 2003 to the first quarter of 2012. For the analysis we only look at individuals that reported having a job in the previous interview. After missing values in some demographic and labor market related variables, the panel sample built in this way shows a total of 97,547 individuals, from which 82,552 (84.6%) were employed at the time of the most recent interview. The rest are unemployed or inactive workers. For the income analysis, in some instances we focus on those individuals for which an income different from zero is observed in both periods. In this case the sample size reduces to 76,282.

The level of inference of the quarter panel data is statistically significant, since approximately 30% of the total sample is panel. As an example, the size of the quarter sample in the EPE is of 4,800 households in 2011 from which 1,500 households had already been interviewed in 2001. In this way, in 2011 the total quarter sample is of approximately 18,500 people. Additionally, the size of quarter sample of the EPE has being increasing throughout time. As a result, the estimates obtained from EPE are currently more precise than at the beginning of the survey.

4 Descriptive statistics and the profile of workers around minimum wage

Data from the EPE is used to characterize individuals with an income around the minimum wage in Lima Metropolitan Area. All workers, whether formal or informal, are included. In doing so, not only workers that earn the minimum wage but also those that earn about the same level of monthly income by informal arrangement are considered.

We provide a demographic profile as well as the type of economic activities in which individuals that earn an income close to the minimum wage are involved. As an operative definition, workers who earn a monthly income that is near the minimum wage (+/- 100 Nuevos Soles) are considered as workers around the minimum wage

Group B, Table 1)[6]. We use data from a pooled sample of EPE surveys (from the first quarter of 2007 to the fourth quarter of 2009) in order to increase sample size[7].

It is found that approximately 18% of the employed population (around 1 million people) earns an income within the minimum wage +/- 100 soles range (Table 1, Group B). Among their main characteristics (Table 2, Group B), on average they are younger compared to the population of reference (34 versus 36 years); 53.7% are men; most of them (81%) work on relatively small firms and lack health insurance (72%). In terms of job categories, 35% self-report as white-collar workers, 32% independents and 25% as blue-collar workers. Table 3 reports the economic sectors in which those that earn around the minimum wage work. As it can be seen, Group B is well diversified within occupations, including independent workers in the retail sector, blue- collar workers in the manufacturing sector, house workers, among others. In unreported results, we show that workers with incomes around the minimum wage are distributed across many different occupations in the Lima area.

Table 1: Employed population by income range

	Number of individuals (in thousands)	%
Group A:		
Below the minimum wage (wage earners and independents)	1495.3	26
Group B:		
Around the minimum wage (wage earners and independents)	997.9	18
Group C:		
Above the minimum wage (wage earners and independents)	3194.7	56
Group D:		
Total (wage earners and independents)	5687.9	100

Source: EPE 2007-2009, INEI.
Note: Results correspond to Lima Metropolitan Area. The population of reference is the average population extrapolated from EPE for the years 2007, 2008 and 2009. We use data from a pooled sample of years to produce these statistics in order to increase sample size. This is important for the analysis because the sample is divided in a large number of cells.

[6]We use this approach to deal with measurement error. The question about income in EPE does not distinguish between gross income and income after taxes and other deductions.

[7]Although there is data from other years available, only from to 2007 to 2009 we are able to observe a harmonic ISIC classification, hence we only use data for these years to produce these descriptive statistics.

Table 2: Profile of workers

	Group A	Group B	Group C	Group D
Age (in years)				
Average	34.9	34.0	36.7	36.1
Standard deviation	15.9	13.0	12.1	17.0
Gender (in %)				
Male	35.6	53.7	65.3	55.4
Female	64.4	46.3	34.6	44.5
Total	100.0	100.0	100.0	100.0
Access to health insurance (in %)				
Has health insurance	21.8	27.6	52.5	40.1
Does not have health insurance	78.2	72.4	47.5	59.9
Total	100.0	100.0	100.0	100.0
Firm size (in %)				
n < 100	95.0	81.7	64.2	75.3
n >= 100	5.0	18.3	35.8	24.7
Total	100.0	100.0	100.0	100.0
Type of occupation (in %)				
Independent	44.6	34.7	27.0	
Blue-collar	13.2	24.6	19.1	
White-collar	17.1	34.6	44.9	
House worker	5.3	6.1	5.4	
Others	19.7	0.0	3.7	
Total	100.0	100.0	100.0	

Source: EPE 2007, 2008 and 2009, INEI.
Note: Results correspond to the Lima Metropolitan Area. We use data from a pooled sample of years to produce these statistics in order to increase sample size.

Table 3: Workers around minimum wage (Group B) by type of occupation and economic sector

	Independent	White-collar worker	Blue-collar worker	House worker
Primary	0.1	0.1	0.6	0.0
Manufacture	3.3	2.9	12.7	0.0
Electricity	0.0	0.0	0.0	0.0
Construction	2.0	0.2	2.7	0.0
Retail and wholesale	13.5	10.8	2.5	0.0
Hotels and restaurants	2.7	2.1	1.6	0.0
Transportation	5.8	2.8	1.5	0.0
Other services	4.8	16.8	3.8	6.3
Sub-total	32.3	35.8	25.5	6.3

Source: EPE, INEI.
Note: Results correspond to the Lima Metropolitan Area. We use data from a pooled sample of years to produce these statistics in order to increase sample size.

5 Minimum wage and income

In this section we utilize recent information that allows us to identify some of the regularities of the effects of the minimum wage over workers income, procedure that may help to complement the current knowledge of minimum wage effects in Peru. We also study the lighthouse effect of the minimum wage, i.e., the hypothesis that the minimum wage in Peru is a benchmark in determining the income of individuals. This hypothesis is supported by the fact that an important portion of workers who receive an income are in the neighbourhood of the minimum wage. The Peruvian data suggests that the changes in minimum wage are related to future movements or adjustments in the monthly workers income. This could suggest that there is statistical correlation that goes from the minimum wage to the income of workers.

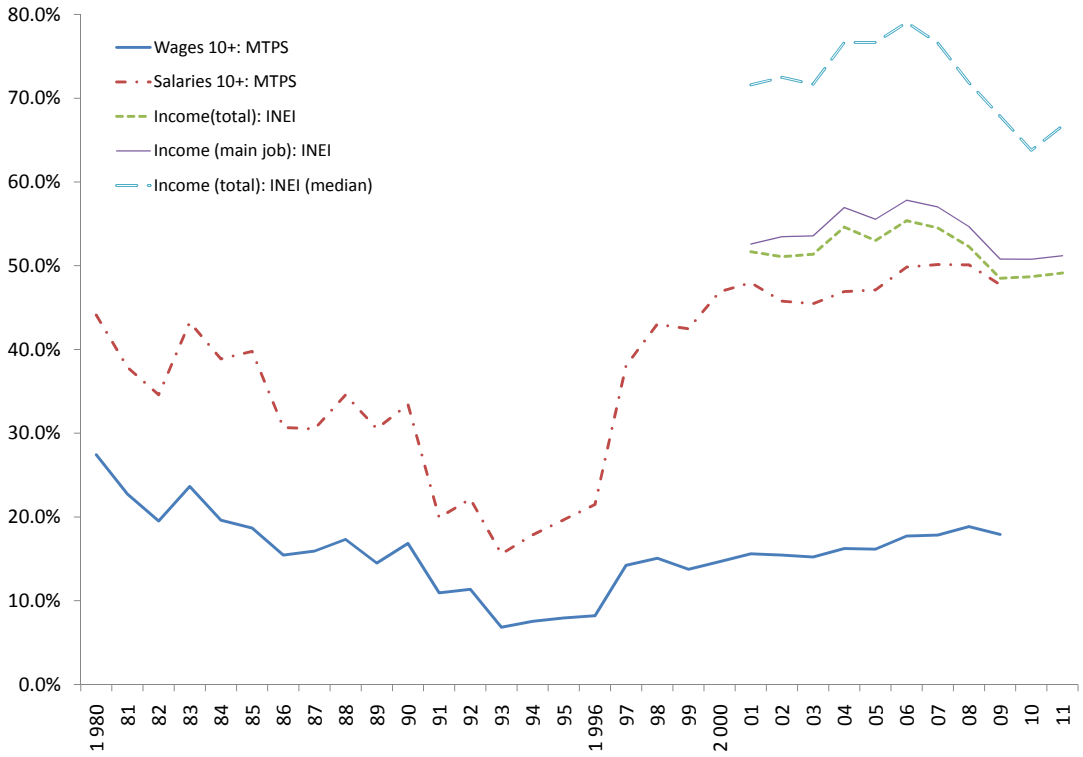
5.1 Minimum wage and mean income

The minimum wage imposes a friction in the labor market and it becomes a relevant variable when the equilibrium wage and the minimum wage are close enough. This would be a particular case to bear in mind for Peru where the value of the minimum

wage represents 60% of the average income, or alternatively, 70% of the median income (see Figure 1). This ratio has shown an increasing trend during most of the 2000 decade. This tendency was registered since 1993 (using data from MTPS). Nevertheless, at the end of the 2000 decade and at the beginning of 2010 we find a slight reduction in this ratio; in such a way that we find similar levels that at the beginning of the 2000-decade. This last result is similar if we use different indicators of the salary such as the estimated income by the EPE, or GDP per-capita or the income and salaries estimated by the MTPS for workers who work in companies of 10 or more workers.

As an explanation to this regularity, during the first seven years of the 2000s, the minimum wage policy was very active and the changes were proportional to the average salary increases. Between 2008 and 2010 no changes in the minimum wage were registered and the significant growth in average income drives the negative trend of this ratio. After two changes in minimum wage (2010 and 2011), we see a slight growth in this ratio. In average, the ratio minimum wage/income in 2011 is similar to the ratio at the beginning of the 2000s.

Figure 1: Ratio minimum wage - income



Source: INEI, BCRP.

In what follows we show microeconomic evidence that comes from the last seven changes in the minimum wage in Peru that suggest that the causality goes from minimum wage to average income in the economy. Even though the evidence comes from Lima, we claim that the minimum wage works as an important benchmark in the determination of salaries and this because most individuals with formal jobs seem to earn around the neighbourhood of the minimum wage.

At the end of the decade, the concentration of workers who receive an income close to the neighbourhood of the minimum wage is higher than that at the beginning of the 2000s. This implies that, at the end of the decade, the changes in the minimum wage would have a larger effect on income with respect to the beginning of the decade. This is particularly true for the formal workers. These regularities are related to the increase of the number of salaried workers (INEI) as well as to the reduction of informality in the labour market during the 2000s (Rodriguez and Higa , 2010). Figure 2 compares the income distribution around the minimum wage in 2003 and 2011. The distribution is narrower near the neighborhood of the minimum wage in 2011. This may suggest

that there is a tendency to receive salaries closer to the minimum wage.

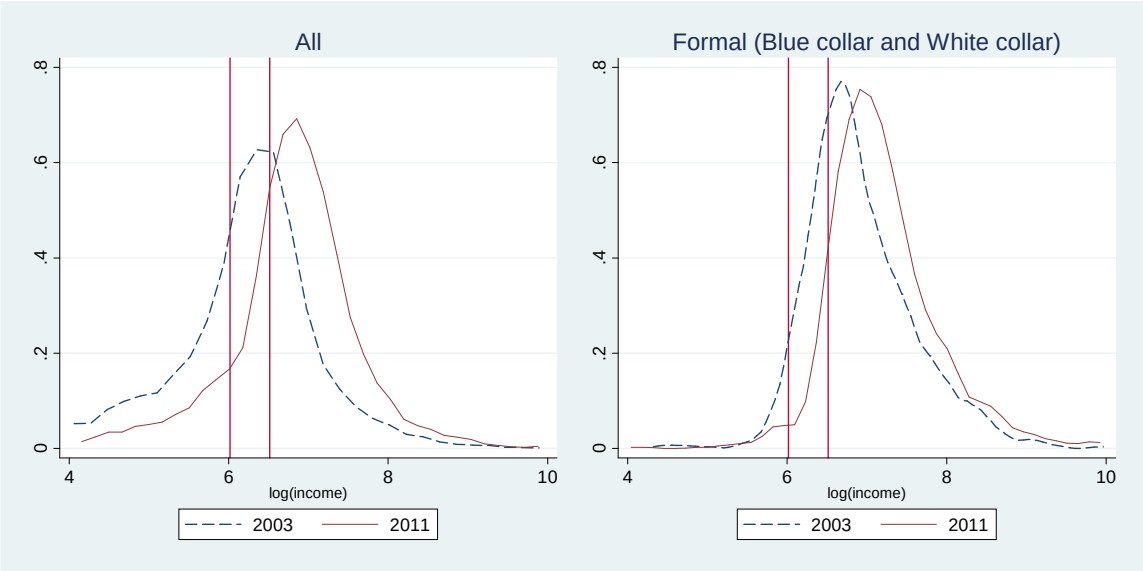
An additional element which illustrates the direct and/or indirect short run effects in minimum wage is measured by comparing the distribution of income before and after the change in minimum wage. The panel sample from the EPE allows us to identify the employment status of workers before and after the change in minimum wage. Figure 3 illustrates, as an example, this comparison for the change in minimum wage in August 2011. Notice that this procedure help to capture only the short run distributive effects of the minimum wage since we only compare the income of two consecutive quarters. From the figure, we can identify a displacement towards higher salaries in the neighbourhood of the minimum wage, while the rest of the distribution does not experience significant changes. The lack of changes is more pronounced amongst formal workers while informal workers experience marginal changes. This exercise is repeated for the last seven changes in the minimum wage and similar results are found in six out of seven of the cases, as it is illustrated in Figures 6 and 7 (see Appendix).

The Peruvian labour market regulation allows a certain degree of indexation in the minimum wage with some components in the salary, in such a way that the increases in the minimum wage have direct effects over some workers, mainly formal ones, even if we consider that in the aggregate they earn more than the current minimum wage.[8] Among these concepts, the one which would have a larger cover would be the family compensation, because it is not proportional to the income.

According to the characterization of minimum wagers, approximately 18% of workers would be directly affected by changes in the minimum wage, while the rest would be indirectly affected. The indirect effect is found in the informal sector of the economy. Figure 3 shows that there is no clear clustering of salaries around the minimum wage in the informal market. The average informal income is close to the minimum wage and all the distribution of informal salaries is displaced in a similar proportion to the changes in minimum wage (see Figure 7 in the Appendix). This would alter the effects of the minimum wage in the long run.

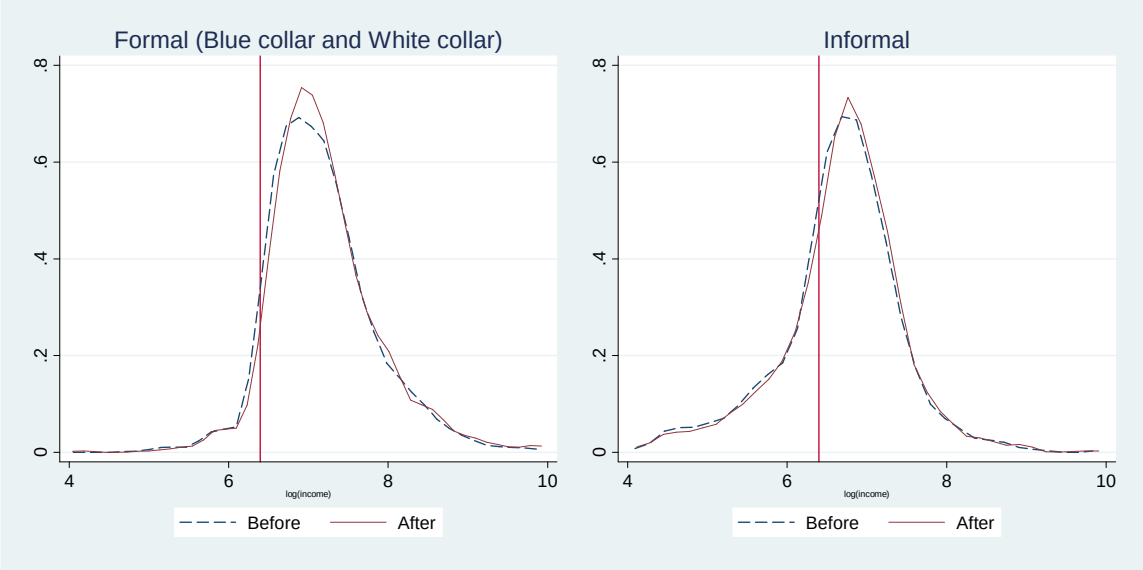
[8] Among these concepts we have: Family compensation (10% of minimum wage), Intern minimum wage (25% above the current minimum wage), Journalist minimum wage (3 minimum wages), Mimimum wage for nigth (30% above minimum wage). Essalud payments (9% of minimum wage).

Figure 2: Income from main job, frequency 2003 and 2011b



Note: Income frequencies (EPE, Lima Metropolitan area). Vertical line represents the minimum wage in 2003 or 2011, respectively. Kernel Epanechnikov function.

Figure 3: Income from main job, Frequencies 2011b



Note: Frequencies before and after the current minimum wage rise (EPE, Lima Metropolitan area). Vertical line represents the minimum wage in 2011. Kernel Epanechnikov function.

5.2 Minimum wage and income: a formal model

In order to more robustly assess the relationship between minimum wage and income, an equation of income determinants at the level of the workers is estimated. This equation includes several controls to capture demographic characteristics, income heterogeneity of workers, income seasonality and the business cycle. We take advantage that in the EPE a share of the individuals is interviewed twice to condition the analysis on some characteristics from the first interview. The specification is as follows,

$$logY_{i,y,m}|(E_{i,y,m-3}=1) = \alpha_y + \alpha_m + \beta logRMV_{y,m} + X_i\Omega + \mu_{i,y,m} \quad (1)$$

where $logY_{i,y,m}$ is the log of monthly income of individual i interviewed in year y, month m;$E_{i,y,m-3}$ is the employment status of the individual three months ago (1 if employed, 0 otherwise); $logRMV_{y,m}$ is the log of the minimum wage prevalent in the same time period; X_i is a vector of controls that include gender, educational attainment, years of experience (including a quadratic term), a dummy for whether the individual is the primary income earner, and the following characteristics observed 3 months before: job category (independent, white-collar worker, blue-collar worker, house worker and other categories), number of employees in the firm, and individual income divided by the minimum wage. The last two variables and educational attainment are included as qualitative categories. The model is estimated conditional on the individual reporting having a job in an interview 3 months before. The model also includes yearly and monthly fixed effects (α_y and α_m, respectively). They allow us to control for trends in income over time (possibly associated to business cycles) and for the seasonality of economic activities.

5.2.1 Main results

Based on this specification, we estimate equation 1 for all individuals that report an income in both periods that is, they belong to Group D in both periods[9]. In this case, the sample size is 76,282. We obtain a statistically significant minimum wage to income elasticity, with a point estimate of 0.25 (see Table 8, Appendix). In other terms, an increase in the minimum wage by 10% increases income by 2.5%. Note that this reflects an average effect. Those who earn significantly more than the minimum wage are less likely to be affected by the increase. Similarly, informal workers might

[9]In practice, some workers that report zero income also have to be excluded.

not benefit or might benefit only partially from the increase.

6 Minimum wage and employment

In this section we study the relationship between minimum wage and employment. As mentioned in Section 2, the general conclusion for the Peruvian case is that the minimum wage has a negative effect on employment. In order to study this relationship, we use the information provided by the EPE, which allows us to track labor transitions in the context of changes in the minimum wage. Our approach allows us to capture not only the transitions in employment towards unemployment and/or towards inactivity but also toward another job (job-to-job transitions). We use the job duration data to estimate the short term job-to-job transitions in the context of a changing minimum wage.

The previous point is particularly important in Peru because the aggregate statistics about employment could not capture adequately the short term job mobility which may be driven by changes in the minimum wage. The employment status of the same worker is observed with a three months lag. These two observations of the same worker does not allow us to identify if this worker has experienced a short spell of unemployment. In a context of changes in the minimum wage, it is possible to observe the same individual working before and after the change in minimum wage and if we do not control for this short term unemployment spell we cannot observe the job loss due to rise of the minimum wage. Given that the unemployment duration in Peru is short, between 12-15 weeks (Chacaltana (2000); Diaz and Maruyama (2000)[10], then the quarterly separation between two consecutive employment status does not allow us to identify the likely destruction (or not) of jobs due to a change in minimum wage. We need to estimate job-to-job transitions in order to identify the role of the minimum wage in employment transitions.

The importance of job-to-job transitions in the identification of the short run effects of the minimum wage on employment is illustrated in Figure 4, which considers the impact of the increase in the minimum wage in 2011. The second graph of this figure shows the job-to-other categories transitions (unemployment, inactivity or other jobs) across the income range.[11] We present the transitions of the treatment group, with

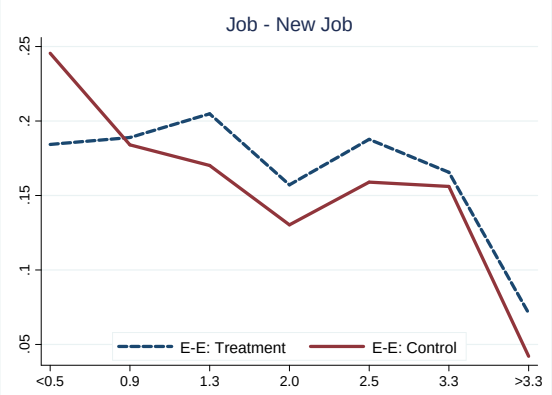
[10]The duration of unemployment estimated from EPE has similar values with a decreasing trend during most of the decade, Céspedes et al. (2013).

[11]The income range is defined according to the income prevalent prior to the change in the minimum wage.

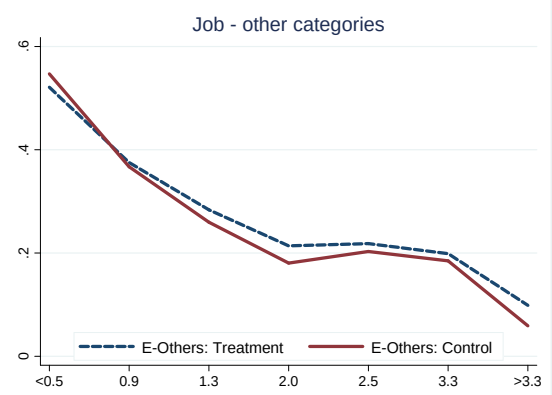
the transition before and after the change in minimum wage (dashed line), as well as a control group (continuous line), which is the same transition for a year before.[12] This figure shows that the job-to-other categories mobility induced by changes in the minimum wage does not seem to be significant for this indicator, as the difference between both groups is small. On the other hand, the situation turns out to be more interesting if we consider only job-to-job transitions induced by the change in the minimum wage in 2011. This situation is registered in the first graph of Figure 4, where higher job mobility is observed in the treatment group compared to the control group across most of the income range. Notice that in the extremes of the income distribution the job mobility is similar for both the treatment and the control group.

Figure 4: Job transitions, 2011b

a) Job - New job



b) Job - Other categories



Source: INEI, EPE.

Note: The figure represents the proportion of employed workers who change to other labour category by income range (panel a) and job-to-job transitions by income range (panel b) (EPE, Lima Metropolitan Area). The x axis is in fractions of the current minimum wage. The dashed line represents the quarterly job mobility indicator of the treatment group, or before and after the current minimum wage increase, while the continuous line denotes the control group, which is the quarterly job mobility indicator in the same months a year before.

The procedure depicted in Figure 4 is applied to all the registered changes in minimum wage during the 2000s, and the results are consistent with the ones previously mentioned in the majority of the cases, with the exception of 2008 as it is shown in Figure 8 (see Appendix). This reinforces the argument that the effects of the minimum wage over job mobility are registered mostly for people earning in the neighbourhood

[12] This controls for seasonality of job mobility in a simple manner.

of the current minimum wage.

We can extend this analysis to other indicators of transition in the labor market. Consider, for instance, the unemployment to employment transitions. In this case, an increase in the minimum wage may reduce the job creation for those workers that expect to receive an income close to the minimum wage. We do not find support for this hypothesis. As shown in Figure 12 (Appendix), we cannot identify a strong movement in the neighbourhood of the minimum wage. In a similar fashion, figures 10, 11 and 13 (Appendix) show that minimum wage changes may not have a clear effect in other employment transitions.

6.1 Minimum wage and employment: a formal model

Using the previous results as a motivation, we estimate a discrete response probit model to capture the relationship between the minimum wage and employment status. We consider the following functional form

$$Pr(E_{i,y,m} = 1 | E_{i,y,m-3} = 1) = G(\alpha_y + \alpha_m \dots + \rho RMV_{y,m} + X_i\Omega + \mu_{i,y,m}) \quad (2)$$

where $Pr(E_{i,y,m})$ takes the value of 1 if individual i is employed in month m of year y. $G(.)$ is the cumulative distribution function of the standard normal distribution $.RMV_{y,m}$ is the prevalent minimum wage in the same time period; X_i is a vector that contains the same control variables used in equation 2. As in Section 5.2, the model also includes yearly and monthly fixed effects (α_y and α_m, respectively) and is estimated conditional on the individual having had a job as reported in an interview 3 months before. The result of interest is the elasticity of the minimum wage to the probability of being employed, conditional on having a job 3 months before.[13]

6.1.1 Main results

Based on this specification, equation 2 is estimated for all individuals that fulfil the condition of having a job three months ago. That is, they belong to Group D in

[13] In this set of estimations the non-employed status includes the unemployed as well as those that self-report as inactive (out of the economically active population). We consider both categories because we are already conditioning the analysis to having had a job three months ago, which already excludes the structural proportion of the population that is not actively looking for a job.

the first interview. Sample size is 97,547. In Table 9, column 1 (see Appendix), the coefficients associated to the model described in Equation 2 are presented using data from EPE (Lima Metropolitan Area). These results imply a negative, statistically significant relationship between minimum wage and employment. In column 2, the model allows for differential effects according to job category: independent, blue-collar, white-collar, house workers and other categories. In this case, results suggest that the relationship initially found holds also for independent workers.

To have a better sense of the results, elasticities derived from these two models are reported in Table 4. The minimum wage - employment elasticity for the average individual in the sample is -0,25; a 10% increase in the minimum wage reduces employment by 2.5%. Highest values of the elasticity are observed for those self-reported as blue-collar and white-collar workers, whereas those self-reported as independent workers are the less affected by changes in the minimum wage regulation.

The average impact of the minimum wage on employment is likely to mask some heterogeneity. A priori those with a formal job are more likely to be affected because formal firms are required by law to fulfil minimum wage policies. In the same way, people who earn the minimum wage, or around it, are likely to be the target of job cuts. To take into account these possibilities, we re-estimate our employment model allowing for heterogeneous minimum wage effects according to the following characteristics three months before: (a) whether or not the individual had health insurance in his job (a proxy of formal employment); (b) position of the individual in the income / minimum wage ratio distribution; and, (c) size of the firm. Results for (b) and (c) are shown graphically in Figure 5. Full results are reported in Table 10 (Appendix B).[14] We observe that workers without health insurance, with lower income levels and working on small firms are the most affected by increases in minimum wage. We find that not only those that earned around the minimum wage are affected, but also those that earned less than the minimum wage are affected. In fact, results suggest that those who earn less than the minimum wage are the most affected. In contrast, those that earn more than four times the minimum wage are not affected.

To check whether a similar relationship between minimum wage and employment can be found at the national level, we use data from the Peruvian National Household Survey (*Encuesta Nacional de Hogares*, *ENAHO*) to produce estimates of this elasticity distinguishing between rural areas, urban areas (excluding Lima) and Lima Metropolitan Area. For this exercise we cannot replicate the model specified in equa-

[14] See coefficients of the Probit model in Table 11 (Appendix).

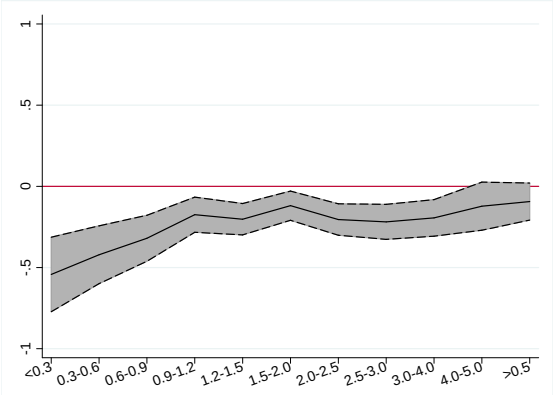
Table 4: Minimum Wage and Employment Status: elasticities (Lima Metropolitan Area)

	Coef.	Std. Err.	t-stat	p-value
Model 1				
Average	-0.256087	0.057772	-4.43	0.000
Model 2				
By type of occupation (3 months before):				
Independent	-0.199087	0.049668	-4.01	0.000
White-collar	-0.317777	0.068920	-4.61	0.000
Blue-collar	-0.332252	0.082312	-4.04	0.000
House worker	-0.247910	0.072333	-3.43	0.001
Other categories	-0.227565	0.057303	-3.97	0.000

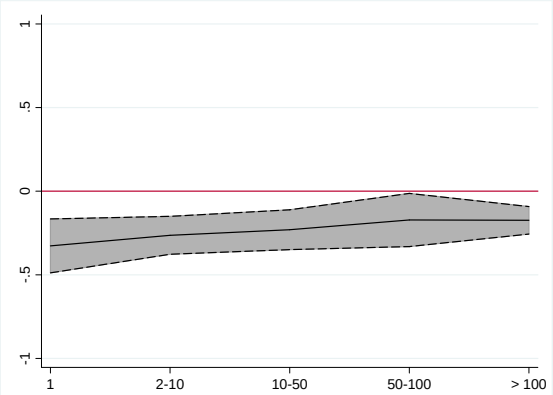
Note: The coefficients from which these elasticities were estimated are reported in Table 9 (column 1 for Model 1 and column 2 for Model 2). All the control variables are kept at their average levels. Sample size is 97,547. Data comes from the EPE (January 2003 to March 2012). Sample consists of all individuals that are observed twice in the EPE and that were employed the first time they were observed.

Figure 5: Heterogeneity of elasticities by firm size and relative income (Lima Metropolitan Area)

a) By income range



b) By firm size



Note: Both graphs report minimum wage-employment elasticities. In the graph on the left, elasticities are reported by relative income groups (the relative income is the individual income reported 3 months before the interview divided by the minimum wage prevalent then). In the graph on the right, individuals are classified according to the size of the firm where they worked three months before.

Table 5: Minimum Wage and Employment Status: main elasticities at the national level)

	Coef.	Std. Err.	t-stat	p-value
Lima Metropolitan Area (Lima)	-0.162	0.099	-1.630	0.103
Urban areas (excluding Lima)	-0.155	0.085	-1.810	0.070
Rural areas	-0.066	0.051	-1.280	0.202

Note: The coefficients from which these elasticities were estimated are reported in Table 11. All the control variables are kept at their average levels. Data comes from the ENAHO.

tion 2. In this database we only have one observation for each individual, which implies that we can not condition the analysis on having had a job t months before, nor can we control for the characteristics of the occupation (firm size, income earned) at that moment of time. This implies that the results are not entirely comparable due to differences in the population of reference. Also, the data used for this estimation is a pooled sample from ENAHO corresponding to the years 2003 to 2010,[15] so we lose two of the seven changes in the minimum wage observed during the last ten years. With these caveats in mind, it is interesting to observe that we obtain qualitatively similar findings in this case. Results are reported in Table 5. For Lima Metropolitan Area we obtain a negative and statistically significant elasticity, albeit slightly smaller than that obtained using data from EPE: -0.16. An almost identical result is obtained for urban areas (excluding Lima area). On the other hand, an elasticity not statistically different from zero at standard confidence levels is obtained for rural areas. This is expected since labor markets are less formalized in those areas of the country.

Our methodology is not directly comparable with del Valle, Jaramillo and Lopez and Jaramillo. In those studies, a treatment group is defined that comprises individuals observed before and after the policy change. A characteristic of that strategy is that only the short-run impact of the policy change is captured, since by construction those that are treated are observed 1 to 2 months after the increase in the minimum wage. However, the effects of the policy change need not to restrict to the next 1 to 2 months after the event. In our estimations we have followed a different route to estimate how employment status changes as the minimum wage increases for all individuals that had a job 3 months ago. Since we do not define a specific treatment group, what we obtain is the overall impact of the policy change, not just the

[15]Data from ENAHO 2011 was not available at the time this analysis was produced.

short-run impact. This has consequences for the interpretation of the results. If jobs that are destroyed by the increase in the minimum wage can be recovered relatively quickly, the short-run elasticity will be larger than our estimates (in absolute terms). Conversely, if the increase in the minimum wage makes a worker more likely to lose his job a few months after the policy change, the short-term elasticity will be smaller than our estimates (in absolute terms).

To check whether the short-run elasticity is smaller or larger than our *overall* elasticity, in Table 8 we re-estimate our main specification defining a treatment variable that takes the value of 1 for those individuals that are observed before and after a change in the minimum wage and 0 otherwise. When doing this we obtain an average elasticity of -0.13. The point estimate is not statistically different from zero. When we calculate the elasticity allowing for heterogeneity by type of occupation an average elasticity of -0.46 is obtained for white-collar workers, a result that is statistically significant. For the other groups (independent workers, blue-collar workers and house workers) the elasticities obtained are not statistically significant. This differs from our previous results in which we obtained a larger average elasticity as well as elasticities that were statistically significant for all the sub-groups by type of occupation. The difference between the two sets of results suggests that an increase in the minimum wage has wider implications on employment status that are not necessarily apparent in the *short-run*.

6.2 Minimum wage and labour mobility

A change in the minimum wage might affect employment in ways that are not captured by the previous definition (1 if employed at the time of the interview, 0 otherwise, conditional on having had a job three months before). People who lose jobs might quickly find new ones (e.g., within less than a month). Depending on the exact timing of the household survey interviews and the changes in the minimum wage, it is possible that people who lost their jobs because of the increase in the minimum wage might have found a new one by the time of the interview. If this is the case, previous results would be a lower bound of the true minimum wage - employment elasticity. To take into account this possibility, we estimate the change in the probability of retaining the same job compared to the alternative of having a new job.[16] Because this is a selected

[16]In the dataset, it is possible to know for how long the individual has been in his current job and whether he had a job 3 months ago. If he had a job 3 months ago but has been less than 3 months in his current position, we assume there was a job transition.

Table 6: Minimum Wage and Employment Status: *short-term* elasticities (Lima Metropolitan Area)

	Coef.	Std. Err.	t-stat	p-value
Model 1				
Average	-0.129	0.096	-1.330	0.184
Model 2				
By type of occupation (3 months before):				
Independent	0.092	0.117	0.780	0.437
White-collar	-0.465	0.159	-2.920	0.004
Blue-collar	0.075	0.214	0.350	0.725
House worker	-0.535	0.351	-1.520	0.128
Other categories	-0.203	0.203	-1.000	0.318

Note: Elasticities are estimated from the following Probit model:
$Pr(E_{i,y,m} = 1 \mid E_{i,y,m-3} = 1) = G(\alpha_y + \alpha_m + ... + \rho CHANGE_{y,m} + X_i\Omega + \mu_{i,y,m})$, where $CHANGE$ takes the value of 1 for those individuals that are observed before and after a change in the minimum wage and 0 otherwise; all the other variables are defined as before. Sample size is 97,547. Data comes from the EPE (January 2003 to March 2012). Sample consists of all individuals that are observed twice in the EPE and that were employed the first time they were observed.

sample composed of individuals who have a job in both periods, we also present results comparing the probability of retaining the same job versus either having a new job, being unemployed or being inactive. This second definition is more comparable with our previous results. These elasticities are reported in Table 7 below.

When using a similar definition to that used in subsection 6.1.1, we obtain a larger elasticity (in absolute value), as expected. On the other hand, when restricting the comparison to those that had a job in both periods the elasticity is smaller and becomes statistically insignificant. This difference might stem from the fact that this is a selected sample of workers with a higher job stability.

6.3 Minimum wage and informality

The previous model is modified to capture the transition from formal to informal employment. The dependent variable is defined as the probability to maintain a formal job compared to having an informal job, being unemployed or inactive at the moment of the interview. As before, the model is estimated conditional on having a job before the change in the minimum wage. The explanatory variables are also the same as before.

Table 7: Minimum wage and job transitions: elasticities using alternative definitions of employment status (Lima Metropolitan Area)

	Coef.	Std. Err.	t-stat	p-value
Dependent variable, alternative 1: 1 if retains the same job (compared to 3 months before), 0 if in a different job	-0.071	0.061	-1.160	0.245
Dependent variable, alternative 2: 1 if retains the same job (compared to 3 months before), 0 if in a different job, unemployed or inactive	-0.304	0.084	-3.590	0.000

Source: EPE, INEI.
Note: Lima Metropolitan Area. **Note:** Each elasticity is estimated from a different model where the definition of employment status changes slightly.

Lacking additional information about the type of contract a worker has, for practical purposes we define formality as having health insurance (public or private). This is only a *proxy* for formality: indeed, it is possible for a worker with health insurance to be informal (e.g., a worker can buy health insurance). When estimating the model using access to health insurance as a *proxy* for having a formal employment, we do not find evidence to support the claim that an increase in the minimum wage leads to a reduction in the average proportion of the population with formal jobs. In fact, the elasticity has a positive sign, however, it is statistically insignificant.[17] In other words, there does not seem to be the case that an increase in the minimum wage leads to more informality. Given that our informal employment indicator is weak due to data limitations we treat this result with caution.

7 Summary

We study the effects of the minimum wage in Peru over income and employment by considering the seven changes registered between 2002 and 2011. Data comes from the EPE to Lima Metropolitan Area and from the ENAHO for the national analysis. We merge the information of the monthly household survey and by doing so we are able to measure the job-to-job transitions as well as the income dynamic due to minimum wage changes. We estimate that about 1 million workers have an income by main

[17] We obtain a elasticity for the average worker of 0,14 with a standard error of 0,17.

occupation in the neighbourhood of the minimum wage, with a greater participation in some sectors and / or job categories (textiles, manufacturing, construction, trade, house workers, etc.).

By using a model that explains the probability of being employed we estimate statistically significant minimum wage-employment elasticity for the average worker. Although on average both formal and informal workers are affected, those seemingly engaged in formal activities are hit harder. The evidence also suggests that those who receive low incomes and those working in small businesses are the most affected by increases in the minimum wage. Effects are monotonically decreasing in absolute terms by firm size, this is, and the effects of minimum wage changes are moderate in big firms and higher in small firms.

The minimum wage -employment elasticity is larger in absolute value (mostly negative) when assessing the probability that the individual is working in the same job in both periods. This suggests that part of the effect of the minimum wage changes on employment is cleared due to the ability of individuals to quickly re-insert in a dynamic labour market (recall the persistent economic growth during this decade). By estimating the model considering informality, we find that the increases in the minimum wage do not appear to reduce the probability of being formally employed. However, this results needs to be revisited with proper data, given that our informal employment indicator is weak due to data limitations.

Finally, we present evidence for the hypothesis that the minimum wage in Peru is a benchmark in determining the income of individuals (lighthouse effect). Causality tests, movement of the income distribution in the context of change of changes in the minimum wage, and the results provided by a model that captures the drivers of income justify these results.

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Appendix

Table 8: Minimum wage and income, main results (Lima Metropolitan Area): Dependent variable is log of monthly income

	Coef.	Std. Err.
Log Minimum Wage	0.252	(0.083)***
Job category in $t-3$		
Independent		
Blue collar	0.01	(0.009)
White collar	-0.041	(0.009)***
House worker	0.053	(0.011)***
Other categories	0.227	(0.01)***
Relative income in $t-3$		
Below or equal to 0.3		
$< 0.3; 0.6]$	0.321	(0.01)***
$< 0.6; 0.9]$	0.623	(0.01)***
$< 0.9; 1.2]$	0.833	(0.009)***
$< 1.2; 1.5]$	0.978	(0.009)***
$< 1.5; 2.0]$	1.139	(0.009)***
$< 2.0; 2.5]$	1.290	(0.01)***
$< 2.5; 3.0]$	1.436	(0.012)***
$< 3.0; 4.0]$	1.609	(0.012)***
$< 4.0; 5.0]$	1.844	(0.015)***
Above 0.5	2.327	(0.013)***
Education level		
No education		
Kinder	-0.302	(0.261)
Incomplete primary	0.003	(0.021)
Complete primary	0.029	(0.021)
Incomplete secondary	0.005	(0.021)
Complete secondary	0.057	(0.021)***
Incomplete technical college	0.069	(0.022)***
Complete technical college	0.138	(0.021)***
Incomplete university	0.125	(0.022)***
Complete university	0.294	(0.022)***
Firm size in t-3 (n. of employees)		
One employee		
Between two and 10	0.086	(0.008)***
Between 10 and 50	0.138	(0.011)***
Between 50 and 100	0.212	(0.017)***
More than 100	0.182	(0.01)***

Note: Method of estimation is ordinary least squares. Sample size is 76,282. Data comes from the EPE (January 2003 to March 2012) and consists of all individuals that are observed twice and that are employed in both periods. Robust standard errors reported in brackets; *, **, *** denote significance at 10%, 5% and 1% levels. Estimations includes year of interview and month of interview fixed effects and the following control variables: access to health insurance in t-3, dummy that takes the value of 1 if primary income earner and 0 otherwise, dummy that takes the value of 1 if male and 0 otherwise, years of experience and years of experience squared.

Table 9: Minimum wage and employment, main results (Lima Metropolitan Area)
Dependent variable: employment status

	(1)		(2)	
	Coef.	Std. Err.	Coef.	Std. Err.
Minimum Wage (in Soles)	-0.00324	(0.000729) ***	-0.00303	(0.000752) ***
Employee x Minimum Wage			-0.000486	(0.000332)
Worker x Minimum Wage			-0.000116	(0.000372)
House worker x Minimum Wage			-0.000180	(0.000623)
Other categories x Minimum Wage			-0.000256	(0.000450)
Job category in $t-3$				
Independent				
Blue collar	-0.405	(0.0467)***	-0.155	(0.177)
White collar	-0.621	(0.0464)***	-0.562	(0.196)***
House worker	-0.202	(0.0449)***	-0.109	(0.324)
Other categories	-0.0622	(0.0489)	0.0687	(0.236)
Relative income in $t-3$				
Below or equal to 0.3				
$< 0.3; 0.6]$	0.408	(0.0351) ***	0.408	(0.0351)***
$< 0.6; 0.9]$	0.692	(0.0354)***	0.692	(0.0355)***
$< 0.9; 1.2]$	0.981	(0.0353) ***	0.981	(0.0353)***
$< 1.2; 1.5]$	1.139	(0.0380)***	1.139	(0.0380)***
$< 1.5; 2.0]$	1.221	(0.0385) ***	1.219	(0.0385)***
$< 2.0; 2.5]$	1.246	(0.0491)***	1.245	(0.0491)***
$< 2.5; 3.0]$	1.276	(0.0605)***	1.275	(0.0605)***
$< 3.0; 4.0]$	1.286	(0.0641) ***	1.285	(0.0641)***
$< 4.0; 5.0]$	1.158	(0.0868) ***	1.159	(0.0868)***
Above 5.0	1.320	(0.0703) ***	1.319	(0.0703)***
Education level				
No education				
Kinder	-0.553	(0.870)	-0.548	(0.871)
Incomplete primary	-0.237	(0.0837)***	-0.238	(0.0837)***
Complete primary	-0.368	(0.0823)***	-0.370	(0.0823)***
Incomplete secondary	-0.459	(0.0838)***	-0.461	(0.0838)***
Complete secondary	-0.435	(0.0825)***	-0.436	(0.0825)***
Incomplete technical college	-0.356	(0.0922)***	-0.358	(0.0922)***
Complete technical college	-0.319	(0.0876)***	-0.320	(0.0876)***
Incomplete university	-0.615	(0.0910)***	-0.616	(0.0910)***
Complete university	-0.438	(0.0889)***	-0.439	(0.0889)***
Firm size in $t-3$ (n. of employees)				
One employee				
Between two and 10	0.450	(0.0403) ***	0.451	(0.0403)***
Between 10 and 50	0.532	(0.0551)***	0.534	(0.0551)***
Between 50 and 100	0.775	(0.0934)***	0.776	(0.0934)***
More than 100	0.892	(0.0536)***	0.894	(0.0536)***

Note: Coefficients of a Probit model for employment. Sample size is 97,547. Data consists of all individuals that are observed twice and that are employed the first time they were observed. Robust standard errors reported in brackets; *, **, *** denote significance at 10%, 5% and 1 levels. Estimations includes year of interview and month of interview fixed effects and the following control variables: access to health insurance in t-3, dummy that takes the value of 1 if primary income earner and 0 otherwise, dummy that takes the value of 1 if male and 0 otherwise, years of experience and years of experience squared.

Table 10: Heterogeneity of minimum wage-employment elasticities by individual characteristics (Lima Metropolitan Area)

	Coef.	Std. Err.
Had health insurance 3 months before:		
No	-0.234	(0.061)***
Yes	-0.276	(0.058)***
Size of the firm 3 months before:		
One employee	-0.327	(0.082)***
Between 2 and 10	-0.264	(0.058)***
Between 10 and 50	-0.230	(0.061)***
Between 50 and 100	-0.172	(0.081)***
Above 100	-0.174	(0.042)***
Location in the income distribution (relative to minimum wage; 3 months before):		
$< 0.3; 0.6]$	-0.543	(0.117)***
$< 0.3; 0.6]$	-0.421	(0.091)***
$< 0.6; 0.9]$	-0.320	(0.072)***
$< 0.9; 1.2]$	-0.175	(0.055)***
$< 1.2; 1.5]$	-0.202	(0.049)***
$< 1.5; 2.0]$	-0.119	(0.046)***
$< 2.0; 2.5]$	-0.204	(0.049)***
$< 2.5; 3.0]$	-0.219	(0.055)***
$< 3.0; 4.0]$	-0.194	(0.057)***
$< 4.0; 5.0]$	-0.122	(0.076)
Above 5.0	-0.094	(0.058)

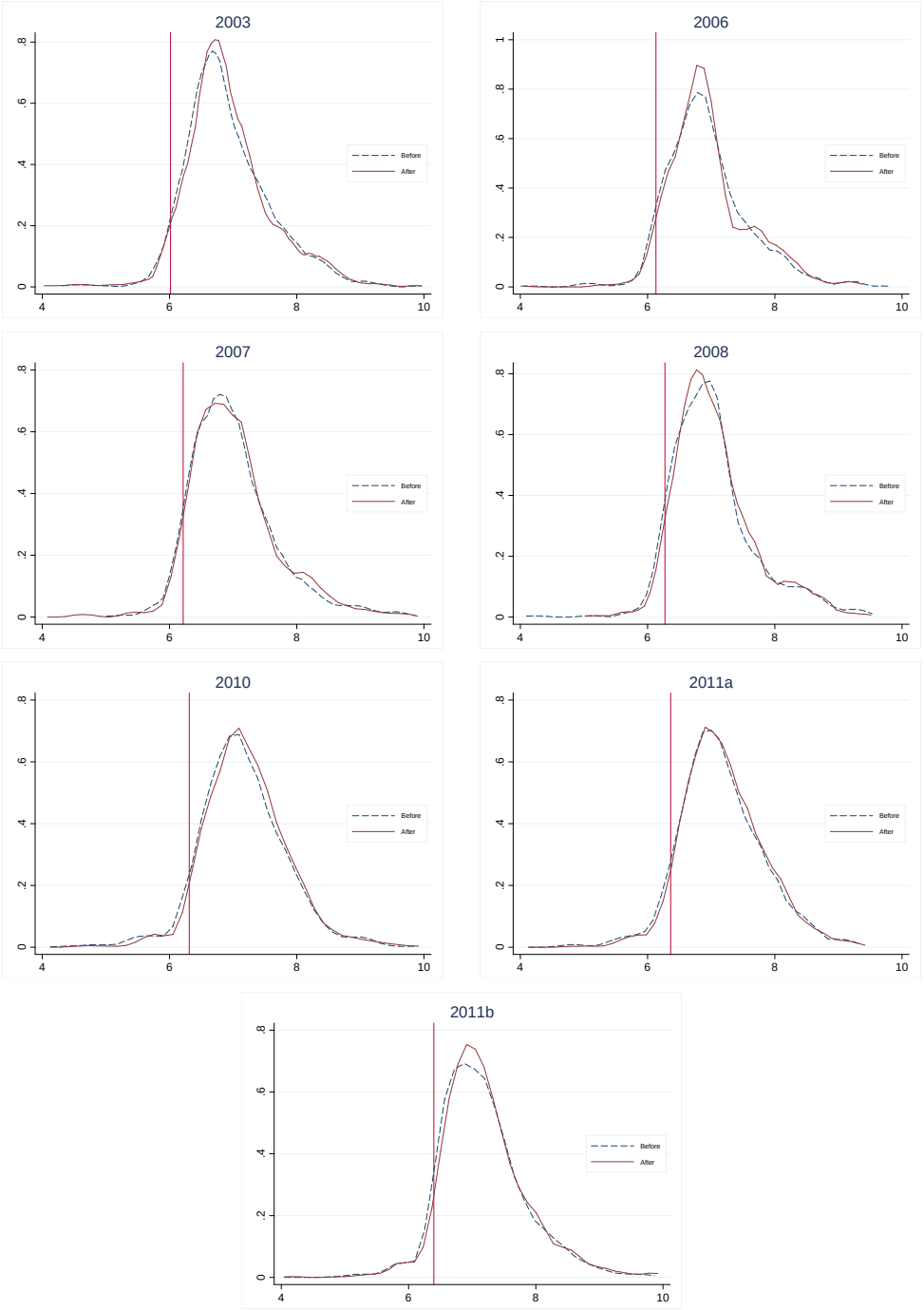
Note: Coefficients come from different regressions. Coefficients of a Probit model for employment. Sample size is 97,547. Data comes from the EPE (January 2003 to March 2012) and consists of all individuals that are observed twice and that are employed the first time they were observed. Robust standard errors reported in brackets; *, **, *** denote significance at 10%, 5% and 1% levels. Estimations includes year of interview and month of interview fixed effects.

Table 11: Minimum wage and employment, national level Dependent variable: employment status

	Coef.	Std. Err.
Minimum Wage	0,0006	-0,00048
Minimum Wage*Urban	-0.00152***	-0,00021
Minimum Wage*Lima	-0.00147***	-0,00026
Education level		
No education		
Kinder	-0.561***	-0,209
Incomplete Primary	-0.175***	-0,0179
Complete Primary	-0.333***	-0,0188
Incomplete Secondary	-0.670***	-0,0189
Complete Secondary	-0.437***	-0,019
Incomplete technical college	-0.504***	-0,0248
Complete technical college	-0.0956***	-0,0229
Incomplete University	-0.990***	-0,0233
Completed University	-0.111***	-0,0248
Other household characteristics		
1 if primary income earner, 0 otherwise	1.085***	-0,0111
1 if male, 0 otherwise	0.785***	-0,0079
Age	0.187***	-0,0010
Age (squared)	-0.002***	-1,17E-05

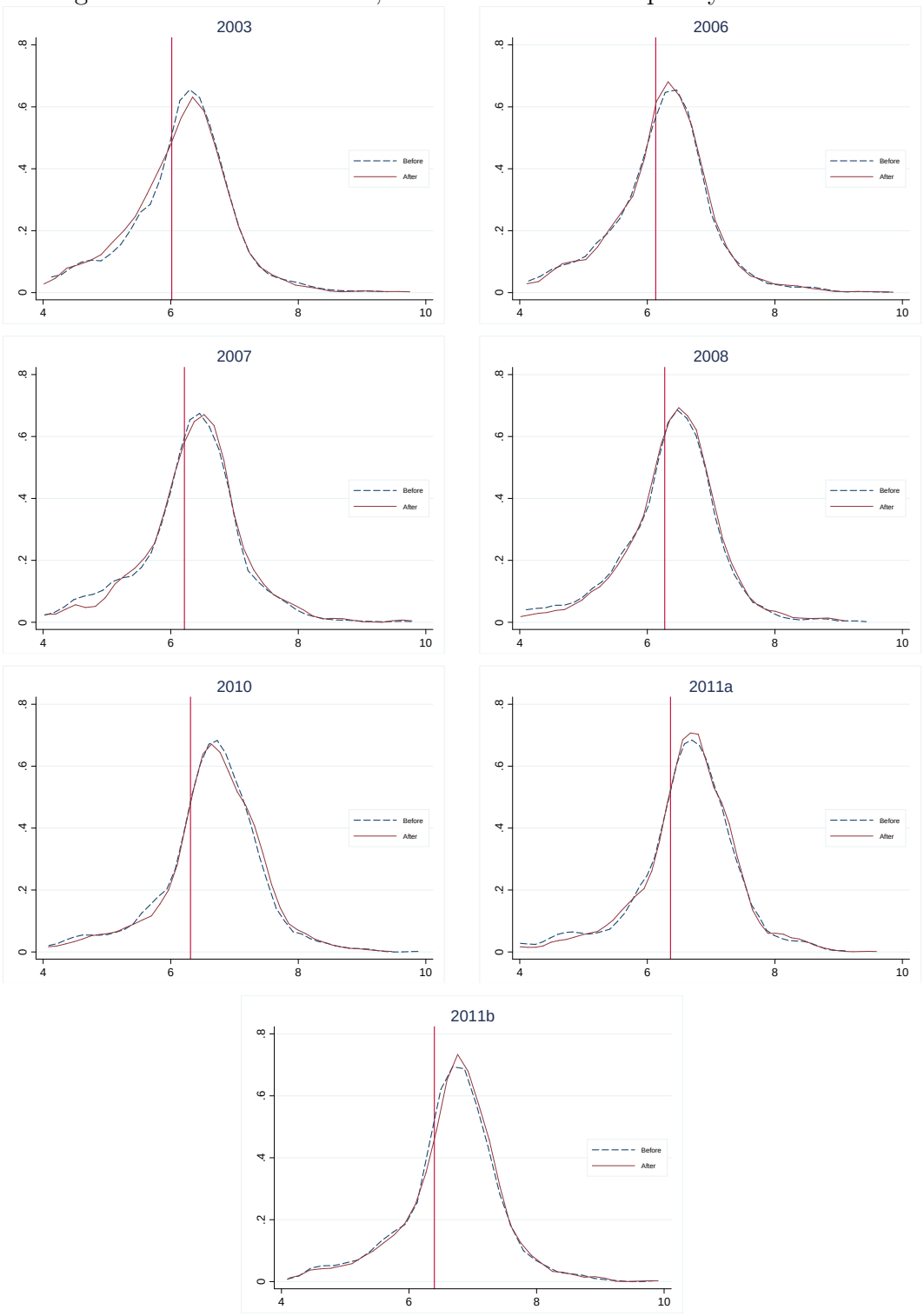
Note: Coefficients of a Probit model for employment. Robust standard errors reported in brackets; *, **, *** denote significance at 10%, 5% and 1% levels. Estimations includes year of interview and month of interview fixed effects.

Figure 6: Main Job Income, formal salaried workers: frequency 2003-2011b



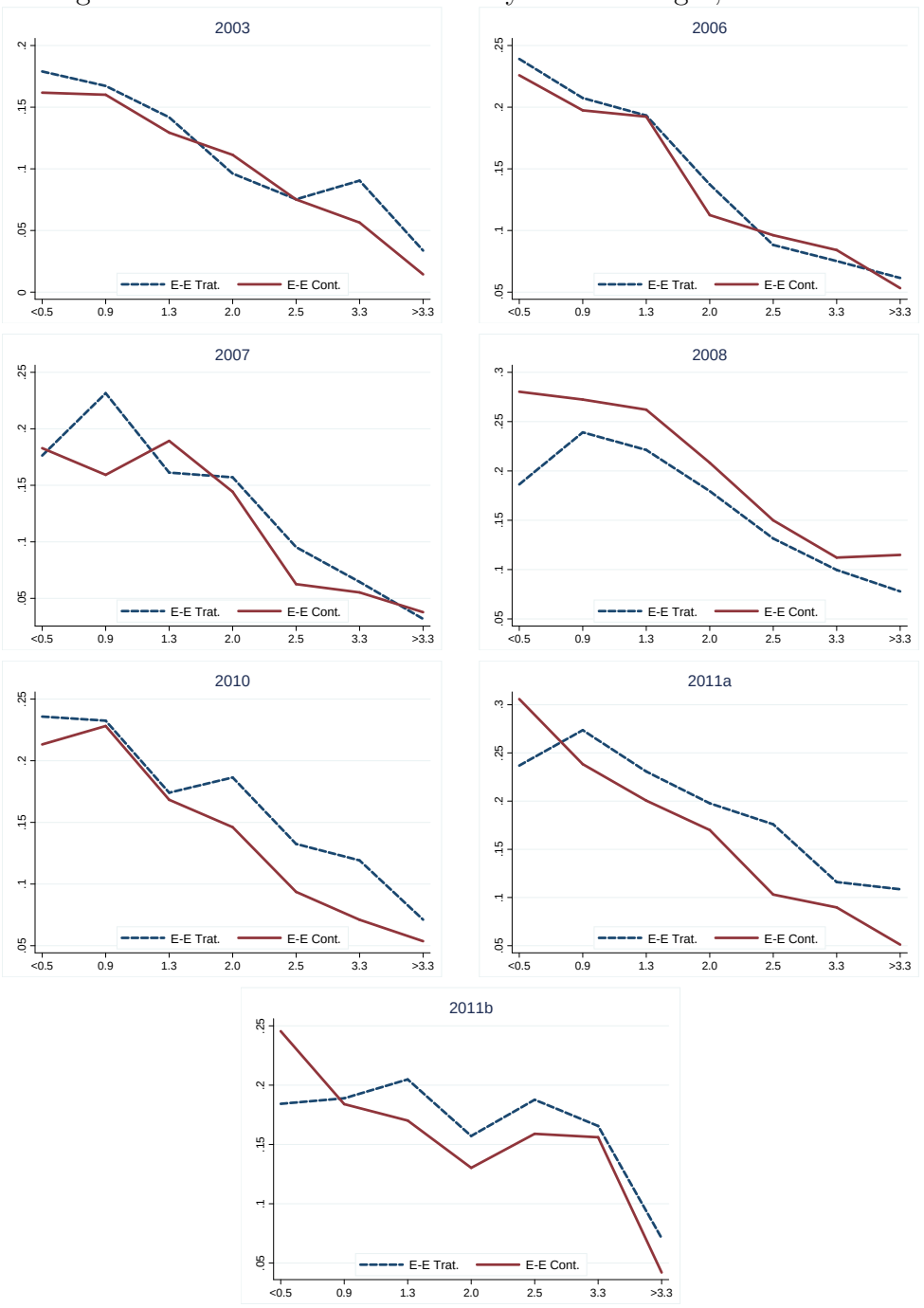
Nota: Income frequencies before and after the current minimum wage rise (EPE, Lima Metropolitan Area). The x axis is in Logarithm of income. Vertical line is the minimum wage before the current minimum wage increase. Kernel Epanechnikov function.

Figure 7: Main Job Income, informal workers: frequency 2003- 2011b



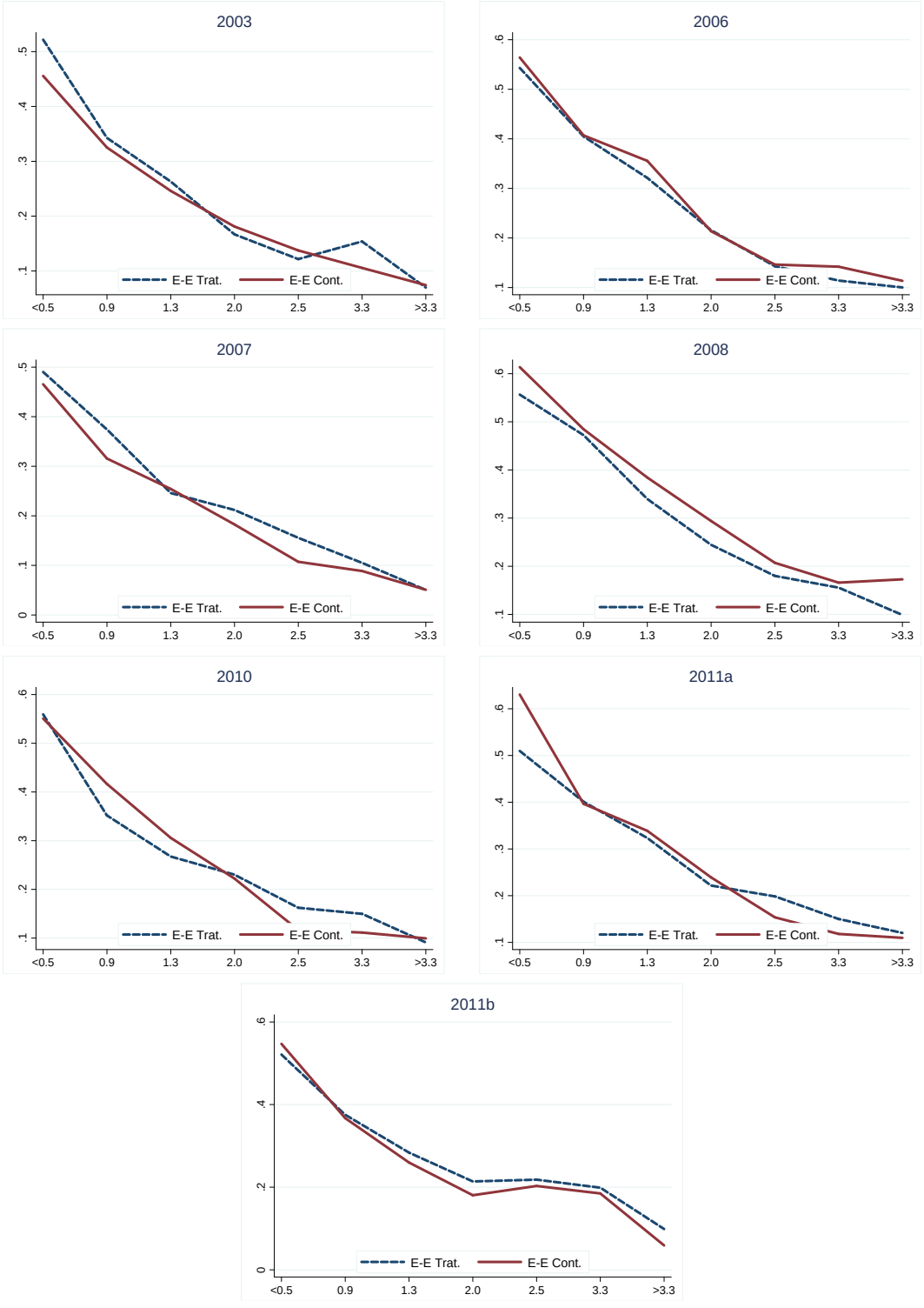
Note: Income frequencies before and after the current minimum wage rise (EPE, Lima Metropolitan Area). The x axis is in Logarithm of income. Vertical line is the minimum wage before the current minimum wage increase. Kernel Epanechnikov function.

Figure 8: Job-to-Job Transitions by income ranges, 2003- 2011



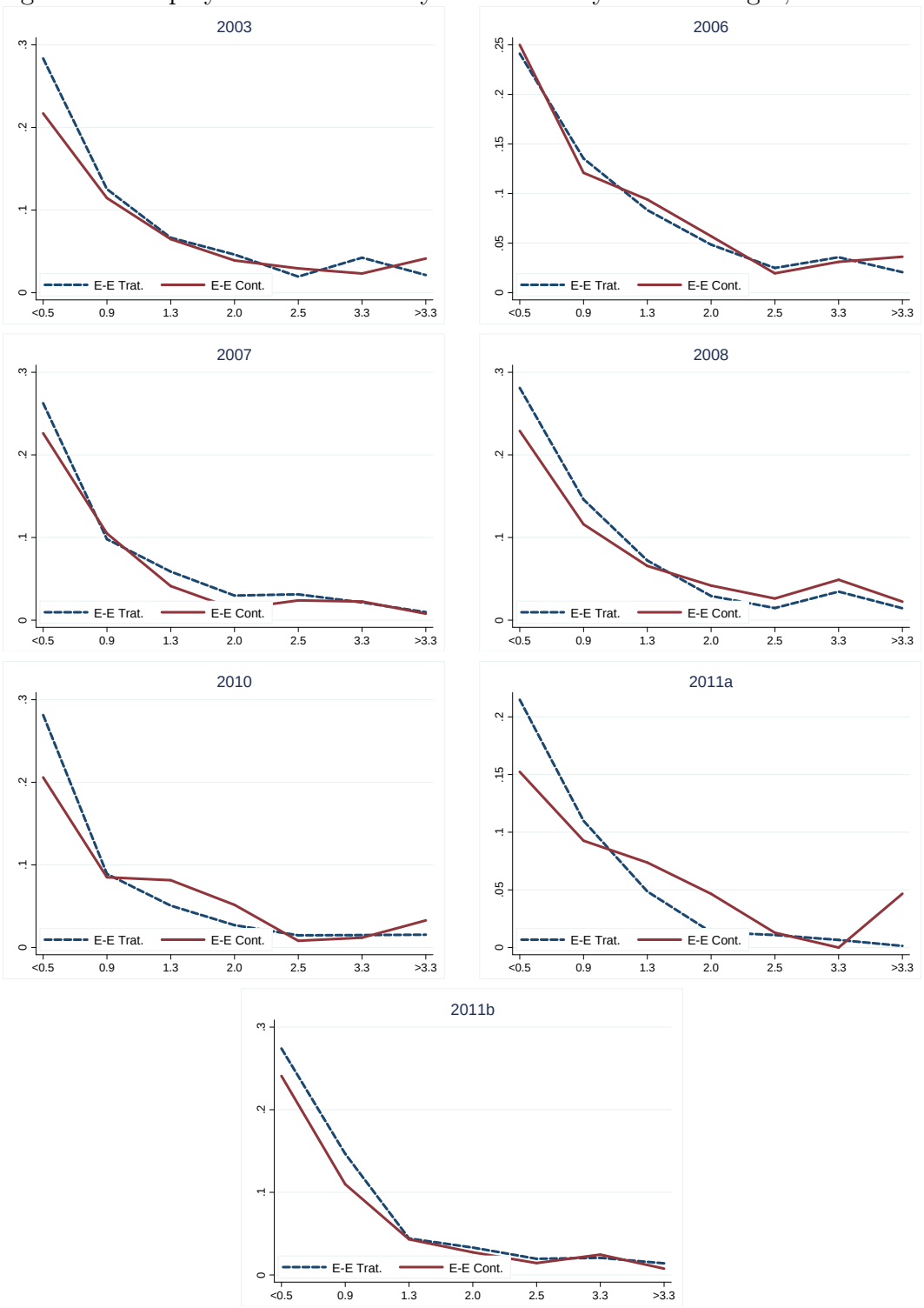
Note: The graphs represent the proportion of employed people who change to another job by income range (EPE, Lima Metropolitan area). The x axis is in fractions of the current minimum wage.

Figure 9: Employment-to-Other categories transitions by income ranges, 2003- 2011



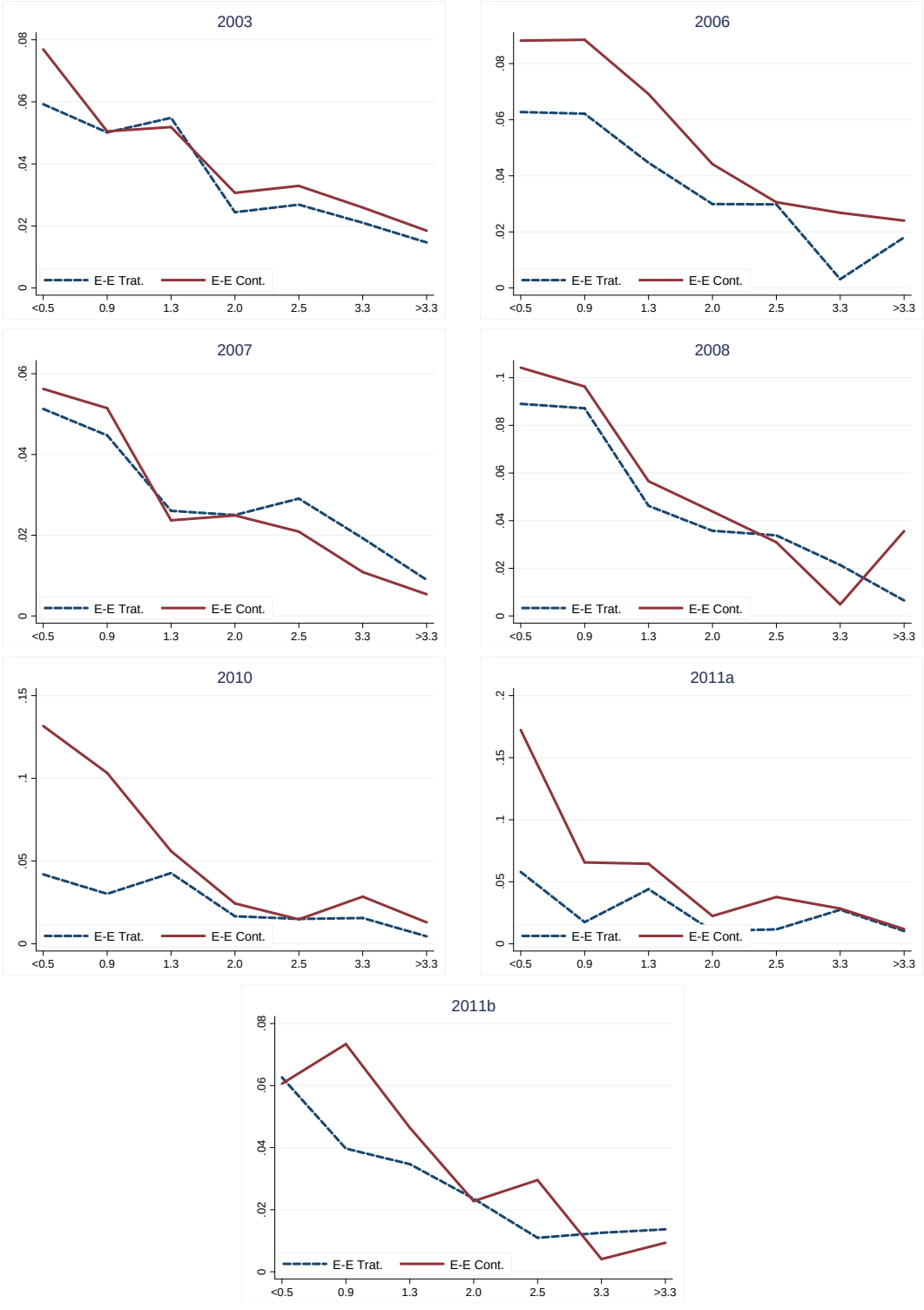
Note: The graphs represent the proportion of employed people who change to other labor category by income range (EPE, Lima Metropolitan area). The x axis is in fractions of the current minimum wage.

Figure 10: Employment-to-Inactivity transitions by income ranges, 2003- 2011



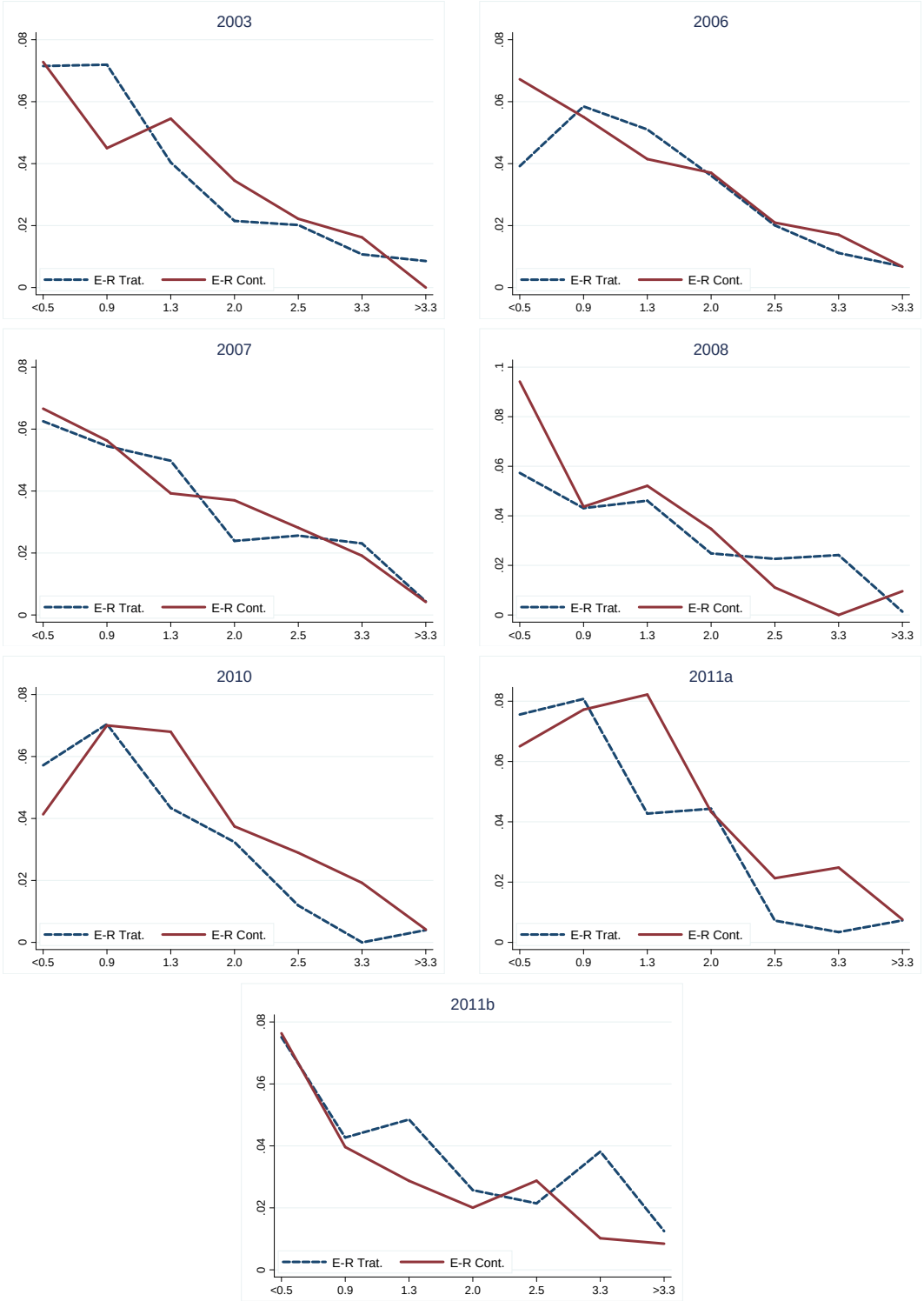
Note: The graphs represent the proportion of employed people who change to inactivity by income range (EPE, Lima Metropolitan area). The x axis is in fractions of the current minimum wage.

Figure 11: Employment-to-Unemployment transitions by income ranges, 2003- 2011



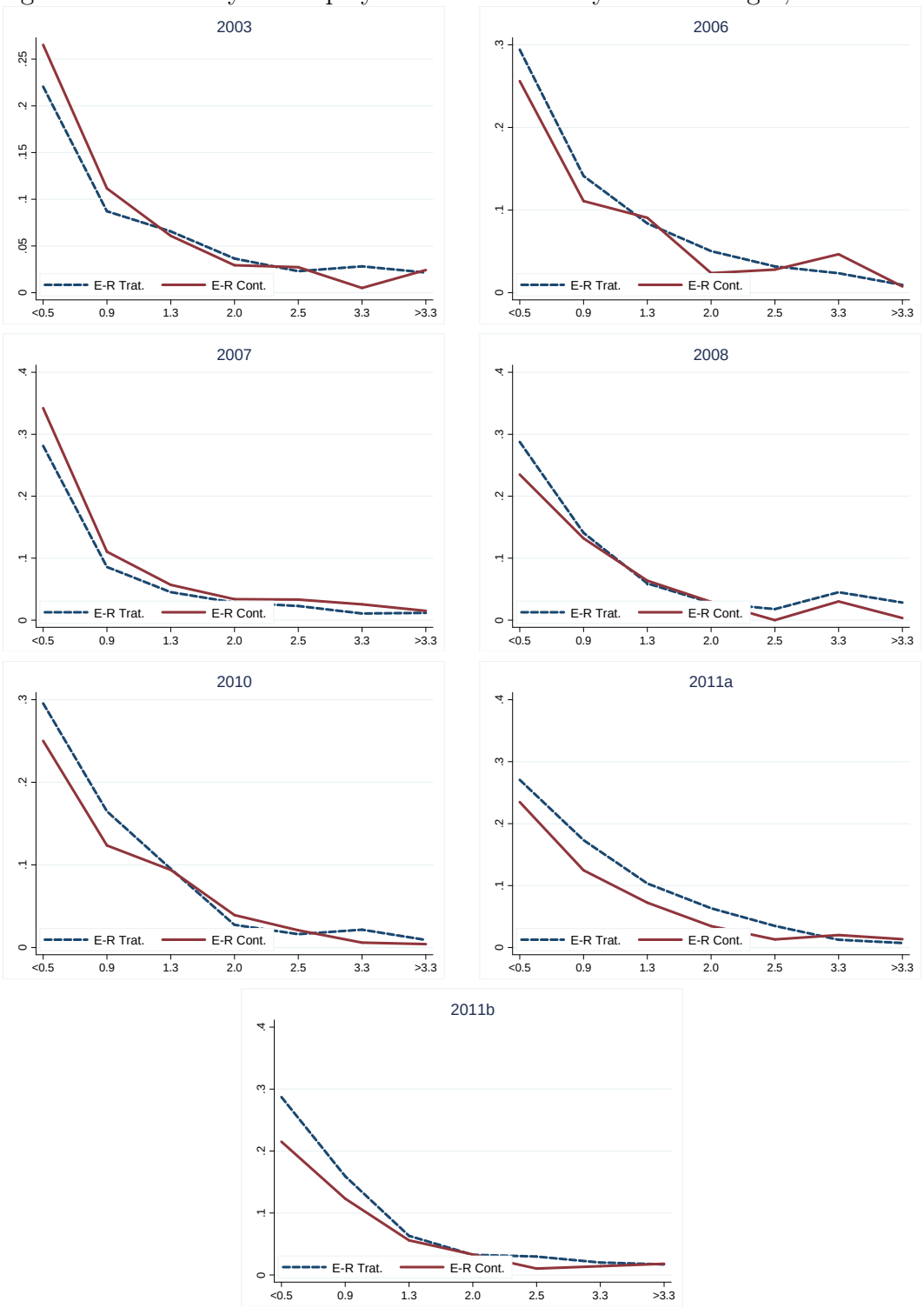
Note: The graphs represent the proportion of employed people who change to unemployment by income range (EPE, Lima Metropolitan area). The x axis is in fractions of the current minimum wage.

Figure 12: Unemployment-to-Employment transitions by income ranges, 2003- 2011



Note: The graphs represent the proportion of unemployed people who change to employment by income range (EPE, Lima Metropolitan area). The x axis is in fractions of the current minimum wage.

Figure 13: Inactivity-to-Employment transitions by income ranges, 2003- 2011



Note: The graphs represent the proportion of inactive people who change to employment by income range (EPE, Lima Metropolitan area). The x axis is in fractions of the current minimum wage.

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