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Who Pays for and Who Benefits from Minimum Wage Increases? Evidence from Israeli Tax Data on Business Owners and Workers

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ABSTRACT

A key goal of a higher minimum wage is income redistribution towards low-income families. Existing research on the minimum wage focuses on the impact on affected workers, but is silent on the incomes of the owners of businesses who pay for a higher minimum wage. Higher minimum wages will do more to redistribute income if the owners of businesses who pay the higher minimum are at the top of the income distribution, and conversely if minimum wage employers hare relatively low incomes, the redistributional effects are weakened. We study evidence on this question using a unique administrative dataset on the universe of tax records for Israel, in the period surrounding a large minimum wage increase. We find that the minimum wage hike reduced profits of companies, with minimum-wage intensive companies bearing the bulk of the cost and adjusting their workforces more aggressively, and profits declining more for lower-income business owners. Moreover, owners of businesses with higher shares of minimum-wage workers ranked at the bottom of the income distribution of business owners, and their incomes were comparable to those of mid-to-high level workers. In most cases, spouses of business owners earn less than the owners while spouses of minimum-wage workers earn more, further reducing the redistributive effect of the minimum wage increase.

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1. Introduction

At its core, the minimum wage is a redistributive policy, meant to increase the incomes in the hands of low-income families. In the U.S. context, Senator Edward Kennedy remarked that "The minimum wage was one of the first – and is still one of the best – anti-poverty programs we have" (Clymer, 1999, p. 449).

Existing research on the minimum wage focuses on the impact on affected workers. Many of the research findings on the minimum wage are contested. There is little doubt that higher minimum wages raise wages of affected workers. There is much recent evidence that higher minimum wages reduce employment of the least-skilled (for recent evidence, e.g., see Belman and Wolfson, forthcoming; Clemens and Wither, 2019; Kabátek, 2015; Gopalan et al., 2018; Meer and West, 2016; Monras, 2019), but there is also recent evidence to the contrary (e.g., Cengiz et al., 2019).[1]

In terms of redistribution, researchers have studied whether minimum wages reduce poverty. Most research tends to find no statistically significant evidence of poverty reductions (e.g., Sabia and Nielsen, 2015), although the point estimates tend to point in this direction (see, e.g., Neumark, 2016; Dube, 2018), and one recent study finds evidence of substantial poverty reductions (Dube, 2019).

There is, however, a potentially important unexplored dimension of the relationship between the distributional effects of minimum wages and the impact of minimum wages on businesses – not in relation to who *benefits* from the minimum wage, but in relation to who *pays* for it. However, the research literature is silent on the incomes of the owners of businesses who pay for a higher minimum wage. Higher minimum wages will do more to redistribute income if the owners of businesses who pay the higher minimum are at the top of the income distribution, and conversely, if minimum wage employers have relatively low incomes, the redistributional effects are weakened, and – on this dimension at least – minimum wages are not effectively redistributing from high-income individuals or families to low-income individuals or families. In that sense, the minimum wage could be quite different from other

[1] For a comprehensive review of recent evidence, see Neumark (2019a).

redistributional policies financed by taxes – such as the U.S. Earned Income Tax Credit. Redistributional policies financed by taxes by construction distribute income *from* those who pay the most taxes, although how progressive this financing side of the redistribution is depends, of course, on the progressivity of the tax system.

Casual evidence suggests we should not be too certain about the a priori answer to the question of the distributional effects of the incidence of the minimum wage on businesses. There are likely many relatively small, lower-income business owners who use low-skill workers and hence will have to pay for higher minimum wages. But there are also some large corporations (e.g., Wal-Mart) that also pay relatively low wages. On the other hand, there are clearly many higher-income business owners, investors, and salaried workers who will not pay directly for a higher minimum wage, and it seems likely that this is true of many of those who have had the highest income growth in recent years.[2]

The likely reason for the absence of evidence on this question is the lack of data on the incomes of business owners. In this paper, we use a unique administrative dataset on the universe of tax records for both workers and firms in Israel, in the period surrounding a large minimum wage increase that was an exogenous event driven by political bargaining, to estimate the incidence of the costs of higher minimum wages with respect to the family incomes of business owners, and the family income distribution more generally. To the best of our knowledge, this is the first evidence of its kind on the incomes of business owners who pay for higher minimum wages and their position in the income distribution.

We find that the minimum wage hike reduced profits of companies, with minimum-wage intensive companies bearing the bulk of the cost and adjusting their workforces more aggressively, and profits declining more for lower-income business owners. Moreover, owners of businesses with higher shares of minimum-wage workers ranked at the bottom of the income distribution of business owners, and their incomes were comparable to those of mid-to-high level workers. In most cases, spouses of

[2] For example, Piketty et al. (2018) note that in the United States, the surge in top incomes since 2000 has been mostly associated with capital income.

business owners earn less than the owners while spouses of minimum-wage workers earn more, further reducing the redistributive effect of the minimum wage increase.

2. Minimum Wages in Israel

The first collective labor agreement regarding minimum wages in Israel was signed in 1972. In this initial agreement, the minimum wage level was set as a percentage of the average wage in the economy.[3] Since 1987, instead, the minimum wage level was to be set by legislation, with the statutory constraint that the minimum wage could not be less than 39 percent of the average wage in the economy.[4] In April 1988, this statutory floor for the minimum wage was raised to 45 percent of the average wage. Nine years later, in April 1997, the law was amended again. There was a small increase in the statutory floor for the minimum wage, which increased to 47.5 percent of the average wage. However, the indexation to the average wage was not done consistently; rather, the ratio was used as guidance when there was a change in nominal value of the minimum wage.

This is shown in Figure 1, which graphs the minimum wage as a percentage of the average wage, and graphs the statutory percentage, from 1995-2018. The figure shows that despite the minimum/average wage ratio specified in successive minimum wage law amendments, the minimum wage was typically lower than required by the mandated ratio in the early years, as the minimum wage was not updated according to the law. Conversely, the minimum wage law prohibits lowering the minimum wage due to indexation, and indeed during a recession in 2001-2003 the average wage in Israel decreased and the minimum wage – which was not reduced – rose above the statutory floor. Since that time, the minimum wage has stayed nearer to the statutory floor, although there have been periods of increases, and in recent years the minimum wage has risen well above it.

The minimum wage "event" we study occurs in the mid-2000s. Figure 1 shows that the minimum wage fell relative to the average wage for many years from about 2003 on. Indeed, in this

[3] The minimum wage is set in hourly and monthly terms, but the two are compatible, based on full-time work.
[4] The average wage is computed by the Central Bureau of Statistics (CBS) based on administrative records provided by the National Insurance Institute, covering the entire economy. It includes both full-time and part-time jobs.

period – prior to 2006 – no updates to the nominal minimum wage level were made. However, in the subsequent three years the nominal minimum wage was increased in three increments, leading to a sizable increase in the minimum wage relative to the statutory floor from 2006 to 2008. There were then no updates to the nominal minimum wage from 2008 to 2011, as evidenced by the decline in the relative minimum wage in this period, and indeed the minimum wage did not increase appreciably relative to the average wage until 2015.[5]

This variation in the nominal wage in Israel during this the sample period we analyze – 2003-2010 – is depicted in Figure 2. For the three-year period, the total nominal increase was 15.4%. Figure 3 depicts the longer-run evolution of the statutory minimum wage in Israel. This figure shows the relative stability of the statutory minimum wage before and after the 2006-2008 increases.

The minimum wage increases that occurred in 2006-2008 were the result of a lengthy campaign led by the Labor Party (HaAvoda), which won 19 (16%) seats in the elections for the 17th Knesset (Israel's parliament). After the elections in 2006, the Labor Party, led by Amir Peretz, who previously served as the head of largest labor union, became one of the key government coalition parties. Increasing the minimum wage and supporting "fair" earnings were among their pre-election commitments (see Appendix A). Hence, the increases in the minimum wage in this period did not result from labor market developments, but rather were an exogenous event driven by political bargaining.

As shown in Figure 4, the years we study were a period of modest declines in the unemployment rate and improvement in output gap. There were no significant sharp cyclical changes around the time of the minimum wage increases we study, although there was an uptick in the aggregate unemployment rate and in the output gap (measured negatively) in 2009. In all of our analyses, we are careful to compare

[5] The next minimum wage increases following those in 2006-2008 occurred in July 2011 and October 2012, when the minimum wage was raised to NIS (New Israeli Shekels) 4,100 and then NIS 4,300. In November 2014, the "Histadrut" (the national labor union) and the Coordinating Bureau of Economic Organizations agreed to raise the minimum wage in the business sector, which later also applied to public sector employees (with certain limitations). As a part of the agreement, the minimum wage increased to 5,000 NIS in three stages, in April 2015, July 2016, and January 2017. On March 30, 2015, an additional collective agreement was signed between the Histadrut and Coordinating Bureau of Economic Organizations, according to which the minimum wage rose to NIS 5,300 in December 2017.

developments in businesses more affected vs. businesses less affected by the minimum wage increase, even within industry, to net out any aggregate influences.

The 2006-2008 minimum wage increases led to a large relative increase in the minimum wage relative to the average wage in this period, as there was only moderate growth in the average wage from 2006-2009; this is why Figure 1 shows the minimum wage converging to the average wage in this period. Figure 5 depicts the real increases (relative to the CPI published by the Israeli Central Bureau of Statistics). Given the large increases in the 2006-2008 period, their exogenous nature, and the fact that the increases were preceded and followed by periods of an unchanging minimum wage, in this paper we study the effect of the 2006-2008 increases in the minimum wage.

3. Minimum Wage Research on Firms

The literature on the effects of minimum wages on labor markets is voluminous. For example, Neumark and Wascher (2007) review over 100 studies of the employment effects of minimum wages, focusing only on papers since the early 1990s. Belman and Wolfson (forthcoming) review many recent studies of employment effects. Broader reviews of the minimum wage literature are provided in the books by Neumark and Wascher (2008), Belman and Wolfson (2014), and, earlier, Card and Krueger (1995). These broader reviews focus mostly on employment effects, but also cover many other outcomes, including poverty and the distribution of wages and income, skill accumulation, and prices.

As noted in the Introduction, we know of no work that studies the impact of minimum wages on the incomes of business owners who pay for higher minimum wages, and their position in the income distribution. However, there is a very limited literature on the effects of minimum wages on firms that might at least provide some clues as to how minimum wages affect business income or profits, and for which businesses.

Card and Krueger (1995) do an event study of the effects of the 1990-1991 federal minimum wage increases – and news stories related to them – on the daily excess returns of stock prices for two subsamples of firms: one of 110 firms in industries with the highest proportions of minimum wage workers; and the second of 28 firms (mostly in the restaurant industry) that referred to the 1990-1991

increases in their annual reports. They also do a similar analysis of events related to a proposal to increase the minimum wage to $4.75 (it went to $4.25 in 1991). In general, the results of these analyses are rather weak, without a clear indication that profits fall, although as Card and Krueger noted, this could be because the news events studied did not provide much relevant information to market participants.[6] Moreover, because this research applies to publicly-held firms, it cannot provide direct evidence on the incomes of those affected by paying for higher minimum wages. Stocks are on average held by high-income people, but they are also held by pension funds.[7] (Our analysis, as well, faces the challenge of not being able to interpret data on the effects of minimum wages on the profits of publicly-held firms in terms of the income of owners.)

More compelling evidence on the effects on firms comes from an analysis of the introduction of the minimum wage in the United Kingdom in 1999 (Draca et al., 2011), because the authors of this study can directly measure firm-level profits. They use pre-1999 information on the distribution of wages (triangulating different sources of information on average wages and the distribution of wages) to measure differences in how firms are impacted, and find significant reductions in profitability (but no impact on employment). Draca et al. point out that one virtue of one of the data set they use – the FAME (Financial Analysis Made Easy) data – is that it covers a wide range of firms, including smaller and medium-sized firms (and of course many firms not listed on the stock market), although some small firms are excluded from having to report data. They also present an analysis of data on U.K. residential care homes – a very low-wage sector – and find corroborating evidence. Draca et al. report (based on the FAME data) that the negative effect of the minimum wage on profits is more evident for firms with more market power as measured by the Lerner Index (based on the price-cost margin), which they argue is consistent with the idea that more competitive firms are more likely to pass on minimum wage increases

[6] Similar ambiguous findings are reported for an event analysis of stock prices in New Zealand (Pacheco and Naiker, 2006).

[7] For the United States, Wolff (2017, Table 10) shows that direct stock ownership is heavily concentrated in the top 1% of the wealth distribution (53.4% for 2016, vs. 40% in the next 9% and 6.8% in the bottom 90%), while pension accounts are more equitably distributed, but still skewed to higher-wealth households (13.7% in the top 1%, 51.2% in the next 9%, and 35.2% in the bottom 90%).

to prices. However, this evidence does not map into how effects are distributed across the income distribution of business owners.[8]

A slice of the research literature focuses on small businesses. It seems plausible that the incomes of small business owners are considerably lower than those of other business owners or other potentially high-income professional workers. Thus, this evidence may provide some information on how minimum wage impacts are distributed across the income distribution of business owners, and the income distribution more generally.

Mason et al. (2006), in a study of the U.K. minimum wage, focus explicitly on the small business sector, while also considering how effects differed across geographic regions based on the "bite" of the minimum wage relative to the wage distribution. Their work is based on a cross-sectional survey of small businesses in 2003, which coincided with an increase in the minimum wage of 30 pence for adults and 20 pence for 18-21 year-olds (on bases of £4.20 and £3.60, respectively), which the authors say is the first increase higher than the average wage increase since the introduction of the national minimum wage in the United Kingdom in 1999. The survey is largely subjective, recording answers regarding likely responses of wages, employment, and other firm-level choices, although firms appear to have been asked how many workers had to have their wages raised; moreover, the response rate is only 12%. Not surprisingly, survey responses indicated that more firms in low-wage industries would have to raise wages. Curiously, 70% of firms indicating they increased wages also indicated their wage bill would be unaffected (perhaps because hours or wages would be cut, which some respondents also said would occur). Just over 20% of respondents indicated that they expected a decrease in profitability.[9]

In U.S. policy debate, minimum wage opponents often appeal to the difficulties small firms will face as a result of minimum wage increases. For example, the U.S. Chamber of Commerce, in criticizing

[8] Belman and Wolfson (2014) review five additional studies of effects of minimum wages on profitability or what might be considered related measures – exits or failures. Machin and Wilson (2004) also study the effects of the introduction of the U.K. minimum wage on closures of residential care homes, based on their own survey. They find some evidence of employment declines, but do not detect a closure effect on homes more impacted by the minimum wage. Two other papers report conflicting evidence on firms exits or failures (Waltman et al., 1998; and Orazem and Mattila, 2002).

[9] The responses were in terms of likelihood of outcomes, not magnitudes.

a proposed New Orleans living wage law in 2002, argued that "the mandated wage increases … will hit small businesses the hardest."[10] More recently, the Virginia Chamber of Commerce argued that a proposed minimum wage increase in Virginia "would primarily impact small business who rely on affordable labor to compete."[11] And a website published by the Employment Policies Institute includes videos of small business owners claiming difficulties in adjusting to high minimum wages.[12] The reasons are not always made clear, reference is often made to small profit margins,[13] or a high share of wages in total costs (e.g., Chava et al., 2019).

Minimum wage laws reflect the reasonable presumption that small businesses (and hence their owners) have lower incomes. For example, U.S. minimum wage laws have long had a minimum sales or revenue threshold (currently $500,000).[14] And the recently introduced Seattle minimum wage increased more slowly for small employers when it was phased in, and has a lower final level for them.[15] Reflecting similar concerns, in Korea a large minimum wage hike in 2018 was accompanied by compensation to firms employing less than 30 workers. The compensation covered the difference between minimum wage increase and trend wage growth rate in the past five years, and subsidized social insurance premiums (OECD, 2018). In Israel, the context we study in this paper, the minimum wage is applied to all workers regardless of firm size.[16]

Despite the presumption that small businesses may be hit hardest by minimum wage increases, the empirical evidence is not so clear. Some of the studies discussed above focus on smaller firms, such as the Draca et al. (2011) analysis of residential care homes, which tend to be small, the Mason et al.

[10] See https://www.uschamber.com/press-release/us-chamber-challenges-living-wage-law.
[11] See https://www.marketwatch.com/press-release/virginia-chamber-of-commerce-releases-fact-sheet-on-proposed-minimum-wage-increase-2019-01-16.
[12] See https://www.facesof15.com/.
[13] See, e.g., https://www.pbs.org/wnet/chasing-the-dream/stories/minimum-wage-increase-means-small-businesses/ and https://nsba.biz/dems-pushing-minimum-wage-hike/.
[14] See https://www.dol.gov/whd/minwage/q-a.htm.
[15] See https://www.seattle.gov/Documents/Departments/LaborStandards/OLS-MW-multiyearChart2019FINAL10118(1).pdf. Note that the threshold for small firms under the Seattle law is high – 500 or fewer employees.
[16] The only possible exemption is that the Ministry of Labor can set a lower minimum wage for mentally or physically disabled workers employed in pre-defined organizations that receive budgets from the government. (See https://www.nevo.co.il/law_html/Law01/P222K11_001.htm#Seif11, item 17, in Hebrew).

(2006) survey evidence, and a study by Orazem and Mattila (2002) that focused on firms in services and retail newly covered by Iowa's minimum wage law. However, these studies were not explicitly focused on the question of whether minimum wage effects fell more heavily on small businesses, comparing minimum wage responses in a uniform way, with comparable data, between smaller and larger firms.

The only study of which we are aware that provides an analysis of effects by firm size is a recent paper by Chava et al. (2019). They use the National Establishment Time Series (NETS),[17] and estimate the effects of minimum wage increases on establishment credit (*Paydex*) scores. They find that federal minimum wage increases in states where the federal minimum wage binds reduced credit scores, more so for small establishments (defined as below median sales in the 4-digit NAICS code); differences in effects associated with sales were likely related to differences in effects associated with incomes of business owners. They also report that minimum wage hikes increased firm exit, and again find evidence of more adverse effects for small establishments. The Chava et al. study is the best evidence of which we are aware that minimum wages (in the United States) have more adverse impacts for small businesses. But again, one can only draw an indirect inference from this evidence that lower-*income* business owners are more adversely affected.

4. Data

Sources and key variables

Our empirical analysis relies on a database created using administrative records of the Israeli Tax Authority. The data set we use is constructed from three sources, matching between company records, employee data, and business owners. Moreover, family income variables for business owners and minimum wage workers are constructed using these data.[18] The key variables we construct and use, and some others used in the analysis or in auxiliary calculations, are listed and defined in Table 1.

The first data source is annual files of company tax records covering 2003-2010. The company

[17] For details, see Neumark et al. (2007).
[18] According to Tax Authority records, family income consists of both spouses' incomes only, as discussed more below.

files provide data on each company's characteristics and indicators of business activity, such as sales and industry classification. The company files are used to construct annual measures of profits, or corporate income from all sources, including reimbursement of the owner's salary. Profits are translated using inverse hyperbolic sine (IHS) function, which is similar to natural logs, but can accommodate zeroes and negative numbers (Ravallion, 2017); the interpretation of estimated coefficients of right-hand side variables when the dependent variable is expressed in terms of the IHS are nearly identify to the interpretation when the dependent variable is expressed in terms of natural logs.[19] We also construct a profitability measure defined as corporate income divided by sales. Finally, we use the Central Bureau of Statistics (CBS) classification of economic sectors to define 23 sector dummy variables.

The second data source we use is tax records of all employees for 2003-2010, which were matched to the employers. The employee files provide data on each worker, including employment type, wages, and number of months the employee worked at the same job. It is important to note that our tax records include employees for whom pay is reported to tax authorities in Israel, i.e., if a company is situated in Israel. The data files also cover temporary employment abroad that is included in the payroll of an Israeli company. However, people who work abroad and their "center of life" is not in Israel are not included in the tax files.[20] For each company, we match all employees based on unique personal and company identifiers. We created the database at the employee level, with workers matched to respective firms over time, and then calculated employee-related aggregates for each firm, including total employment.

Our research does not cover self-employed workers or employees related to these individuals (in

[19] As an example, the table below shows some calculations for the change in log profits and the change in IHS profits.

Initial profits	Change in profits	Change in log profits	Change in IHS profits
-10000	1000	Undefined	0.105360515
-100	10	Undefined	0.105354652
100	10	0.09531018	0.095305841
1100	100	0.09531018	0.095310136
1100000	100000	0.09531018	0.09531018

[20] According to the tax law, citizens with "center of life" abroad (based on a given set of criteria such as presence in Israel, family location, etc.) are not liable for taxes in Israel.

unincorporated businesses). In 2005, there were approximately 287,000 self-employed workers, representing 11.5% of employment.[21] There were 61,460 unincorporated businesses that employed 126,688 workers.[22] The majority of these unincorporated businesses were very small, averaging around 2 employees per establishment.[23] Regardless, the self-employed are not relevant for studying the impact of minimum wages, as the self-employed decide on their own wage given tax and business considerations. Thus, we study only incorporated companies.

We use the data on employees to construct a critical variable for our analysis: the percentage of workers earning below or equal to the minimum wage. Specifically, we define a fraction-affected variable, *FMW*. We define *FMW* as the fraction of full-year employees working at their main job,[24] in 2005 (the last year of the pre-treatment period), who were paid less or equal to the monthly minimum wage that prevailed in the post-hike period (2009-2010). We base *FMW* on full-year employees working at their main job, because when we compared the Tax Authority wage reports with those of the Central Bureau of Statistics (CBS) by industry, we found that the wages of employees that worked full year at the main job were closest to the wages that CBS reports. In addition, we define *POST* as a dummy variable for the post-treatment period (2009-2010) after the minimum wage increase.[25]

The third data source is a registry of company owners for 2003-2010. The files include ownership structure for each company and allow for identification of individual business owners.[26] For both business owners and workers we construct measures of family incomes. We identify owners and their spouses (when present) of the companies in the sample for the year 2005. This is the most recent year before the minimum wage hike, and the year for which *FMW* was computed. Of the 57,520 companies in that year, we could identify data on 47,275 sole owners (out of a total of 63,674 owners,

[21] Based on CBS data (https://old.cbs.gov.il/publications18/1673/pdf/t02_01.pdf).
[22] These figures relate to 2010, as prior data regarding self-employed are less reliable.
[23] There is a small number of larger establishments of this kind, with tax records tying workers directly to company owners (i.e., to the individuals who own the companies, rather than the company identifier).
[24] The main job is the one that the worker chooses for the application of tax credits and benefits. In general, if an individual works in more than one job, she chooses to define the higher-paying job as the main job to minimize tax payments.
[25] The treatment period (2006-2008) was excluded from the estimation sample.
[26] Some of the companies are owned by other companies or foreign residents.

because of foreign ownership,[27] firms that are owned by other local companies,[28] and co-ownership). According to the tax records, 60.5% of companies have a single owner, 29.1% have two owners, and the remainder have three or more owners. We assembled data on owners' salary from the company, salary from other sources, age, marital status, and earnings of the spouse. We also define where business owners' and workers' salaries are in the distribution of labor incomes, assigning percentiles in the distribution (between 1 and 100).[29]

Two age-related issues are relevant to the measurement of family income. First, teens could not be matched to the parents, as tax records do not provide information beyond number of children in the household, and hence teenagers' labor incomes are not included in family income. However, teen employment is relatively low in Israel; the participation rate of youths (aged 15-17) is 9.6%, of whom only 1.5% do not study at the same time. According to the income survey published by the CBS,[30] only 7.2% of households had more than two providers in year 2005. And according to tax records, only 3.7% of employees (including the self-employed) were younger than 19 in 2005.[31] Among business owners, the tax records show that there was a single owner (i.e., one person) aged 18 in the year 2005, with owners below the age of 25 constituting fewer than 1% of owners.

Second, military service in Israel is obligatory for men aged (18-21) and women aged (18-20, with some exceptions).[32] Soldiers are reported in the official statistics as part of the labor force, but the army was excluded because it is in the government sector. However, there is no restriction on ownership of companies by soldiers in the family income calculation.

Sample

[27] There were 2,010 companies (out of 57,520 in 2005) that were fully owned by foreigners.
[28] 2,414 companies (out of 57,520 in 2005) were fully owned by other companies.
[29] We study labor income rather than asset income. One problem with asset income is that wealthy individuals can hold large companies, which could post significant losses in given year (in the form of undistributed profits), resulting in low income ranks that would be misleading.
[30] See the 2005 Income Survey (https://old.cbs.gov.il/webpub/pub/text_page_eng.html?publ=11&CYear=2005&CMonth=1).
[31] See the 2005 state revenue administration report (https://mof.gov.il/ChiefEcon/StateRevenues/StateRevenuesReport/DocLib/2005/Report2005_05.pdf).
[32] These were the age ranges during the sample period. The conscription rate for men is above 75% for the majority of cities in Israel (https://www.idf.il/2018-גיוס-נתוני-האדם-כוח-אגף-אתרים/).

To define our sample, we begin with data on all companies that were active in Israel from 2003 through 2010.[33] Our analysis of minimum wage effects covers the period beginning in 2004. Our data start in 2003, but because the calculation of profits requires lagged data for carryover losses, profit measures are available only from 2004. We impose several restrictions to arrive at our analysis sample, as documented in Table 2. (The table also reports some descriptive statistics on key measures, to show how these change with the sample restrictions.)

We exclude the government sector and non-profit organizations, as we would expect such organizations to respond differently to minimum wages than private-sector firms. Moreover, our interest is in the incidence of minimum wages in relation to the owners of firms, and the incomes of firm owners are most simply conceptualized and defined for private-sector firms.

We exclude companies that were in the liquidation process at any point during our sample period. In principle, these events could be related to the minimum wage, in which case we could potentially understate any adverse employment effects of the minimum wage that we find. However, we exclude these companies because they are likely to experience large employment declines and liquidation could be caused by quite different factors.[34]

We do not exclude publicly-held companies. Our sample includes 144 publicly-held companies in 2005, with 135 surviving through 2010.[35]

Companies that are likely to be holding financial companies, based on extreme values of the profitability measure, are also excluded. The reason is that these companies can show extraordinarily high profits relative to sales (or employment), because of the nature of such companies, and also because of ambiguities regarding where profits are assigned relative to where they are generated.[36] We cannot

[33] Firms that exit in 2010 are still included in the sample since the post-treatment period covers 2009-2010. Firms that exited in 2009 or earlier were excluded from the sample.
[34] If we instead exclude those that are in liquidation only in the pre-treatment period, to allow for the possibility that post-treatment liquidation is caused by the minimum wage, 189 observations are added. In this case, the estimated effect of the minimum wage on profits is virtually unchanged (slightly more negative).
[35] We thank Kosta Kosenko for sharing his data on publicly-traded companies in Israel.
[36] For example, in the data there is a company with three employees that reports revenues of a large construction company fully owned by it.

directly identify these firms. However, when we explored extreme profitability values for specific companies, we found that they were frequently of this type.[37] Thus, we restricted the range of the profitability variable to be between −100 percent and +100 percent.

For companies established after 2005, we cannot generate a measure of *FMW* that is independent of employment or wage adjustments after minimum wage increases begin in 2006. Hence, we exclude these companies. Similarly, we had to exclude companies with no wage data in 2005, because the *FMW* calculation requires workers employed full-year at a specific company in 2005. This ends up excluding a fairly large number of companies for two reasons. First, there are some very small companies in terms on number of employees, with high labor turnover during the year. Second, until 2017 there were many companies that were set up for tax purposes, which had made profits but had not distributed them (effectively used as a tax shelter for various professionals due to higher personal income tax rates).

The combined set of restrictions reduces the size of the estimation sample. But we believe our restrictions provide a sample that is informative about the effects of the minimum wage on private-sector firms that employ at least some minimum wage workers.

Table 3 shows that our sample period begins with about 55,000 companies and ends with about 44,000. The number declines because companies had to have been established by 2005 to be included in our sample, so we lose companies through deaths before 2010, but do not gain them through births.

Descriptive statistics

Table 4 provides descriptive statistics on the key variables for our analysis sample. On average, in 2005, the average share of minimum wage workers across companies was 18%. However, as shown in Table 2, these workers were concentrated in fewer than half of all companies (the median value of *FMW* is 0), as 56 percent of companies had no minimum wage workers. (Figure 6 shows the distribution of company-year observations in the estimation sample by *FMW* bins).

[37] We examined extreme values of profitability to try to understand if these represent real activity or some recording technique, and found that the majority of companies with these extremes were holding companies. These companies were fully owned by business group owners and did not have economic activity beyond holding a portfolio of companies.

As reported in Table 4, average profits of the firms in the estimation sample were around 1.3 million NIS, but the median value was much smaller at NIS 0.2 million. It is important to note that profits can be negative (or zero). On average, throughout the estimation sample period, profitability of companies, calculated as profits divided by sales, was 15%.

Average employment per firm was 36 workers. As shown in Figure 7, much smaller companies were concentrated at both extremes of the *FMW* distribution; in particular, firms with only one worker were concentrated at the extreme values of *FMW* = 0% or *FMW* = 100%. Conversely, companies with *FMW* in the range 80-90% were on average largest in terms of employment, with average employment around 250 workers per firm (see Figure 8). The largest company in this range, with 7,304 workers, is a nursing home company; the remainder of the companies in this group were, naturally, in economic sectors with large shares of minimum-wage workers (e.g., cleaning; security; health services and social work).

5. Results

In this section we first report some standard types of evidence on the effect of minimum wages on earnings and employment, and then move on to evidence on how the minimum wage affects company profits and how the cost of minimum wage increases is distributed across the income distribution.

Minimum wage effects on earnings and employment

Figure 9 shows trends in average annual wages,[38] covering the pre-treatment and post-treatment years, for workers in firms with very few minimum wage workers ($FMW \leq 10\%$), firms in the midrange ($40\% < FMW \leq 75\%$), and firms with a high fraction of affected workers ($FMW > 75\%$). In the pre-treatment period, there is no clear difference in the trends in average wages at the three groups of firms. (The slight relative declines at firms with higher *FMW* are consistent with the decline in the minimum wage relative to the average wage shown for this period in Figure 1.)

After the minimum wage increase, wages in low-wage firms grew faster, consistent with a direct effect of minimum wages on wages. Note that the relative increases are largest for the highest *FMW*

[38] Technically, these are earnings associated with the main job position, but since we cover full-year employees on their main jobs, we refer to wages.

firms, as we would expect. There is no evidence of an effect for the low *FMW* firms. Figure 10 presents more detailed evidence, with a more granular disaggregation by *FMW*, showing that the minimum wage increase raised wages more in high *FMW* firms. The figure shows that the average real wage rose more from 2003-2005 to 2009-2010 in firms where the percentage of workers below the minimum wage (*FMW*) was higher, and the relationship is approximately monotonic.

Figure 10 also presents evidence on employment changes. The figure indicates that employment fell among firms with a higher *FMW* (above around 20%), but not at very low *FMW* firms. Moreover, among the higher *FMW* firms, the employment decline was generally sharper the higher *FMW*. The graph labeled "combined" effect is the average wage-weighted employment change. Given that wages rose at the more-affected (higher *FMW*) firms, this series declined by less than employment. This evidence is consistent with rather sharp disemployment effects of minimum wages, given the magnitude of the minimum wage increase (see Figure 5). With regard to expected effects on firm income, the employment declines suggested by Figure 10 will mitigate some of the costs of the higher minimum wage for more-affected firms; but of course, this will also impact firm revenue and income.

It is possible, of course, that the employment changes depicted in Figure 10 reflect different sectoral trends over the sample period, and the correlation between *FMW* and sector, rather than actual employment effects. Hence, in our regression analysis that follows we estimate difference-in-differences regression models with and without sector dummy variables and their interaction with *POST*.

As shown in Table 5, consistent with much of the existing literature, the results shows a negative impact of the minimum wage increase on employment. This is true also in column (2), which adds interactions between dummies and *POST* (as well as the sector main effects). The estimated elasticity from column (2) of Table 5 implies that for a company with *FMW* larger by 10%, the employment decline is 1% larger.

In Table 6, we report estimates from a less constrained model, where instead of using a linear measure of *FMW*, we break *FMW* into a number of categories. In columns (1) and (2) – column (2) includes the sector-*POST* interactions – the minimum wage effect in decreasing employment is increasing

with *FMW*, except in the top range of *FMW* > 80%. However, companies in this top range of *FMW* are quite heterogeneous in terms of their size and their activity, with the companies with very high *FMW* concentrated in different industries and much smaller, which we also noted with regard to Figures 7 and 8. In column (3) of Table 6 we therefore split the *FMW* > 80% range into two groups – 80% < *FMW* ≤ 94% and *FMW* > 94%. The group of companies with 80% < *FMW* ≤ 94% is characterized by large employment, with 196.4 workers on average, while the group of companies with *FMW* > 94% is much smaller, with average employment of 16.8. Moreover, among companies with *FMW* > 94%, 32.9% have only one worker; this percentage is 0.4% among companies with 80% < *FMW* ≤ 94%. Moreover, the sectors are quite different, with companies in the lower range concentrated in wholesale and retail trade (16%), cleaning and security (16%), and health services and social work (12%), while companies in the upper range are very highly concentrated in the latter industry (46%), and also manpower (8%) and business services (7%).

When, in column (3) of Table 6, we break the *FMW* range up in this way we find more negative effects than in column (2). Most notably, it is the effect in the very top range (*FMW* > 94%) that is very small. We believe this is because these companies, having a very high *FMW* share, have less scope for adjusting employment.[39] This conjecture is consistent with the results for the impact of the minimum wage hike on profits; below, we report that the profits of companies with very high *FMW* are reduced more strongly by the minimum wage increase.

Minimum wage effects on profits

We next turn to estimation of the effects of minimum wages on owners. We begin with the effects of minimum wages on profits. Indexing firms by *i*, years by *t*, and denoting firm-level controls (such as the sector dummy variables) by *X*, we first estimate

$$IHS(\pi)_{it} = \alpha + \beta FMW_i + \gamma POST_t + \delta FMW_i \times POST_t + X_i\lambda + \varepsilon_{it} \ . \quad (1)$$

Note that *FMW* has only an *i* subscript, since it is defined at the firm level, but only for the pre-

[39] This can be couched in terms of Marshall's Third Law of Labor Demand, in which under some conditions the elasticity of labor demand is smaller when labor's share is larger (see, e.g., Hoffman, 2009).

treatment period. *POST* has only a period subscript, since it is a dummy variable for the post-treatment period. As shown in Table 7, we begin with a simple specification. We then add sector dummy variables and their interaction with *POST*, to allow for differential changes in profits by sector.

The estimate of δ from equation (1) is a difference-in-differences estimate of the effect of *FMW* – the fraction affected by the minimum wage – on profits. As shown in column (1) of Table 7, profits decline in relative terms for firms with a higher value of *FMW* in the pre-treatment period. The negative estimate implies that a higher minimum wage reduces profits at firms with a high share of minimum wage workers, relative to firms with a low share. Since our sample does not include failed firms, the adverse effect of the minimum wage on higher *FMW* firms could be stronger than this estimate implies.[40]

To interpret the magnitude, recall that in the regressions *FMW* is defined on a scale of zero to one. Thus, based on the estimate in column (1), the estimated coefficient of −0.749 implies that profits declined by about 7.5 percent for firms where the fraction affected by the minimum wage, based on the pre-treatment period data, was about 10 percentage points higher. With the sector dummies and "trends" added, in column (2), this estimate becomes −0.795. These estimates appear to us to be economically significant. For example, the estimated coefficient implies that profits of firms at 75th percentile of *FMW* decline by 21.4% more than profits of firms at the median of *FMW*.[41]

A richer breakdown of firms into 6 bins, based on *FMW*, provides results that reinforce the conclusion that profits fell more at firm with larger share of MW workers (see Table 8). Compared with the zero *FMW* firms in the sample, estimation results show that the minimum wage hike had no statistically significant effect on profits for the second and third bins ($0 < FMW \leq 40\%$). For companies with *FMW* above 40%, profits decline – for the fourth bin (40-60%) by 20%, for the fifth bin (60-80%) by 46%, and for the highest *FMW* firms (80-100%) by 94%. As noted in the previous section, low labor adjustment in the top *FMW* firms can explain the larger negative impact on profits. Hence, the

[40] The data allow identification of failed companies in the post-treatment period, but lacks the information regarding profits for those firms. Assigning zero value for profits can be misleading since profits could have negative values.
[41] The median of FMW is 0.286, and the 75th percentile is 0.555. Multiplying this difference by the estimated effect of −0.795 predicts a decline in profits of 21.4%.

relationship is monotonic. The results are similar when we allow for different changes over time by economic sector (column 2).

Returning to Table 7, the remaining columns (3)-(6) report estimates for the effect of minimum wages on profits for the four quartiles of the profit distribution (based on the data from the period prior to the minimum wage increase) – from lowest to highest. We find the strongest negative impact of minimum wage on profits in the 1st quartile of profits (including companies with losses or near-zero profits). The effect weakens significantly for firms in the 2nd to 4th quartiles. This evidence suggests that it is the low-profit firms that bear most of the cost associated with higher minimum wages.

Minimum wage effects across the income distribution

We noted earlier that a more adverse effect of minimum wages on profits at relatively low-profit firms would likely also predict that a higher minimum wage has more adverse effects on business owners with relatively low incomes. To explore this question, we now alter our regression model to estimate the effects of minimum wages on profit not by *FMW*, but by the owners' income percentile in the income distribution of owners and workers together (see Table 1 for variables definition). Denoting income percentile by *IP*,[42] our regression model now becomes

$$IHS(\pi)_{it} = \alpha + \beta IP_i + \gamma POST_t + \delta IP_i \times POST_t + X_i\lambda + \varepsilon_{it} \ . \qquad (2)$$

We have substituted *IP* for *FMW*, to detect post-treatment changes in profits across the distribution of incomes of business owners. Note that *IP* has only an *i* subscript, since it is defined at the owner level, but only for the pre-treatment period.

The results are reported in Table 9. Recall that a higher income percentile implies higher income of business owners. Thus, the positive estimated coefficients on the *IP* × *POST* interaction implies that profits of lower-income business owners declined more in relative terms in the post-treatment period. For example, the estimated coefficient implies that firms with owners earning median income suffered a 7.9%

[42] The income percentiles are calculated based on universe of business owners and workers in 2005. Owners' income includes wages from owned business and other labor income.

larger decline in profits than those at the 75th percentile.[43] The estimated direct effect is smaller than the decline in profits estimated in Table 7. This could be explained by the fact that we estimate the effect on company profits and not on the owner's business income.[44]

Minimum wage impacts relative to the income distribution

The implication of the preceding estimates is that profits of lower-income business owners were adversely affected by the 2006-08 minimum wage increases. We already saw that profits (and employment) of higher *FMW* firms were also more adversely affected. Column (1) of Table 10 shows why these results coincide. Based on pre-treatment data – as is all the analysis in this subsection – the owners of businesses with higher *FMW* are lower in the income distribution, and the relationship between *FMW* and the income percentile of business owners is nearly monotonically negative.[45]

Note, though, that even among the high *FMW* firms, business owners are relatively high in the income distribution – for individuals, for example (column (1)), ranging from the 74th to the 94th percentile across different *FMW* bins. Thus, this evidence suggests that the impact of minimum wage increases is regressive in terms of the income distribution of business owners, but still relatively progressive with regard to the overall distribution of income.

To provide a richer perspective on distributional effects, column (2) shows the average income percentiles of workers, based on *FMW* at the firms at which they were employed prior to the minimum wage increase. As we would expect, workers in higher *FMW* firms have lower incomes on average; the income percentile declines nearly monotonically with *FMW*.

The comparison across columns (1) and (2) is also of interest. This comparison shows that in the lowest *FMW* firms, workers' average income percentiles are about the same as those of owners in the higher *FMW* firms (in the range of *FMW* above 0.4 or 0.5). In this sense, too, the redistributional impacts

[43] The median of *IP* is 0.9516, and the 75th percentile is 0.9842. Multiplying this difference by the estimated effect of 2.415 predicts a decline in profits of 7.9%.

[44] Owners' income percentile is calculated based on all labor-related incomes including wages of owners in their companies and labor income from other sources. Moreover, a substantial share of companies are owned by more than one owner.

[45] We use pre-treatment ownership data is to abstract from ownership and income changes that could result from the minimum wage hike.

of the minimum wage seem, if not regressive, than at least unfair – in the sense that the burden of the minimum wage is shared very unequally between economic agents at similar points in the income distribution, with owners paying directly for the higher minimum wage, while workers with similar incomes do not. On the other hand, incomes of workers in the high *FMW* firms are clearly lower than incomes of the owners of these firms, and in that sense the minimum wage does redistribute income downward.

Extending the analysis to family income – in columns (3) and (4) of Table 10 – shows an even smaller degree of redistribution for business owners. Families with ownership of the highest *FMW* firms earn slightly less than the median family income in 2005 (column (3)), and the income percentiles for firms with *FMW* > 60% are not much above the median. On the other hand, workers at high *FMW* firms are lower in the family income distribution (column (4)). Thus, we might conclude that, overall, the effect of the minimum wage hike is regressive for business owners (and even more so for families of business owners), but is progressive for workers (and even more so for families including minimum wage workers).

Table 11 provides more details on the income distribution by *FMW* that includes family incomes (adding owners'/workers' spouses). Panel A shows the details for married business owners.[46] Owners of high *FMW* businesses are younger, slightly more likely to be female, and have more children. The first two, at least, are almost certainly associated with lower income. As shown in column (5), average incomes of owners drops dramatically with *FMW* – and the contrast between lower *FMW* firms (e.g., *FMW* below 20%) and higher *FMW* firms (e.g., *FMW* above 30%) is quite striking. Columns (9) and (10) show that incomes of spouses exacerbate the relationship between *FMW* and income, as incomes of spouses are higher for owners of low *FMW* firms, and hence the gaps in family income across the distribution of *FMW* are generally larger than for owner income alone (column (5) vs. (10)). The

[46]The division between married and single provides income comparisons that do not depend on marital status. Among business owners, 85% are married, while the share of married workers is lower at 61%. The comparison of single business owners/workers is shown in Table 12.

numbers in column (11) provide a summary measure showing this conclusion. Thus, overall, family income declines quite sharply as *FMW* increases. These data reinforce the conclusion that, among business owners, the burden of the minimum wage falls on lower-income families.

But how do the incomes of the business owners who bear the burden of the minimum wage compare to the incomes of the potential beneficiaries of higher minimum wages – families with workers earning the minimum wage? Panel B of Table 11 shows that, as expected, average worker wages decline with *FMW* (column (5)) – reflecting the fact that at high *FMW* firms most workers earn the minimum wage. This is reinforced by spouse's wages, which also decline with *FMW*, indicating that incomes of spouses are positively correlated.

However, spouses' earnings do not decline nearly as steeply with *FMW*. Moreover, earnings of spouses of workers in high *FMW* firms are generally much higher, as reflected in the fact that average wages of spouses of those in high *FMW* firms are much higher than those of the workers in these firms (column (8) vs. column (5)). This indicates that a large share of minimum wage workers are the secondary earners in families. This reduces the redistributional effects of minimum wages towards families with the lowest incomes.[47]

At the same time, a comparison of the family incomes of owners and workers in higher *FMW* firms – in column (10) of Panels A and B – indicates that the family incomes of minimum wage workers are much lower than those of the owners of high *FMW* firms. For example, in firms where *FMW* exceeds 90%, average family income of owners is 198,334 NIS, vs. average family income of workers in those firms of 74,137 NIS. And the average family incomes of workers in low *FMW* firms are, for the most part, well below the average family incomes of the owners of high *FMW* firms (except for *FMW* < 10%).

Analysis for singles, who constitute a much smaller share of the sample, provide similar results (see Table 12). As before, incomes of business owners and average wages of workers decline with *FMW*.

[47] This parallels evidence for the United States, for example, that the high share of teens and young adults among minimum wages implies that a large share of the benefits of higher minimum wages do not go to poor families (Lundstrom, 2017).

The main and obvious difference is that single owners do not enjoy additional income of the spouse.

Thus, the conclusions from Table 11 (and 12) are similar to those from Table 10. The higher minimum wage does redistribute income towards lower-income families. But the redistribution is not from the top of the income distribution, but rather from owners whose incomes are higher than those of minimum wage workers, but whose incomes are lower than those of many other owners who do not bear the burden of the minimum wage, and lower than those of many higher-wage workers.

6. Conclusions

In this paper, we study an unexplored dimension of the distributional effects of the minimum wage, turning attention from the question of who *benefits* from the minimum wage to the question of who *pays* for it. A key goal of a higher minimum wage is income redistribution towards low-income families. Existing research on the minimum wage focuses on the impact on affected workers, but is silent on the incomes of the owners of businesses who pay for a higher minimum wage.

We study evidence on this dimension of the distributional effects of minimum wages using a unique administrative dataset on the universe of tax records for Israel, in the period surrounding a large and plausibly exogenous minimum wage increase. The evidence indicates that the minimum wage hike reduced profits of companies, with minimum-wage intensive companies bearing the bulk of the cost and adjusting their workforces more aggressively, and profits declining more for lower-income business owners. Moreover, owners of businesses with higher shares of minimum-wage workers ranked at the bottom of the income distribution of business owners, and their income were comparable to those of mid-to-high level workers. In most cases, spouses of business owners earn less than the owners while spouses of minimum-wage workers earn more, reducing the redistributive effect of the minimum wage increase.

Overall, then, the evidence indicates that the higher minimum wage does redistribute income towards lower-income families. However, the redistribution is not from the top of the income distribution. Rather, it is from owners whose incomes are higher than those of minimum wage workers, but whose incomes are lower compared to other owners who do not bear the burden of the minimum wage, and lower than those of many higher-wage workers.

This evidence implies that minimum wages, while somewhat redistributive, are not effectively redistributing from the highest-income individuals or families (aside from the issue, addressed in prior research, that minimum wages do not do a very good job of targeting benefits to low-income individuals or families). In that sense, the minimum wage is quite different from other redistributional policies financed by taxes – such as the U.S. Earned Income Tax Credit.[48] One potential way to improve the targeting of who *pays* for a higher minimum wage is to create a tax credit that offsets part of the cost of higher minimum wages borne disproportionately by the businesses that employ a relatively higher share of minimum wage workers (Neumark, 2019b) – businesses that, as we have shown, have lower profits and are owned by those with lower incomes than the owners of other businesses as well as high-income workers.

[48] There is also an EITC in Israel (see Brender and Strawczynski, 2019).

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Appendix A

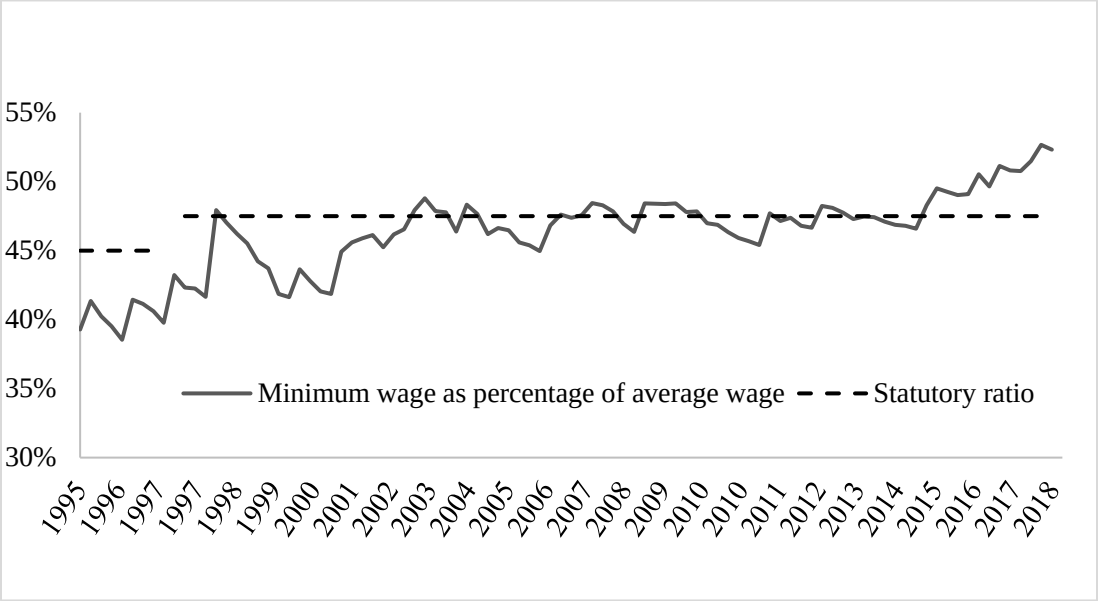
Minimum wages in the 2006 elections

This Appendix discusses the importance of the minimum wage during the pre-election period prior to the 2006 general elections. Amir Peretz, who served in a previous role as a head of the national labor union (Histadrut), promised to increase the minimum wage, and later during coalition negotiations insisted on a minimum wage hike. Below are excerpts from official statements by the Labor Party:

> "The challenge facing the Israeli society is to accelerate the processes of economic development and growth, and to ensure fair distribution to the public… The government, led by the Labor Party, will set a goal of reducing unemployment, raising minimum wage, effectively enforcing labor laws, reducing social gaps in income, education and housing quality."
>
> – Labor party pre-election platform

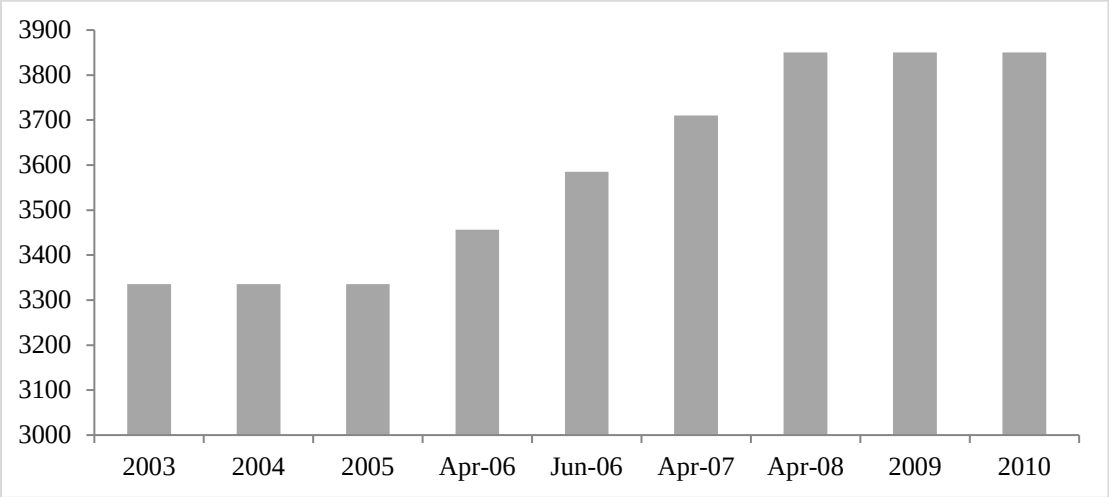
> "Mr. Speaker of the Knesset, Ministers, Members of the Knesset…First of all, I am glad to tell to all of those who said that the last increase of the minimum wage will cause a severe crisis to the unemployment rate, that if the minimum wage will be raised the crisis for the economy will be unmanageable- we see nowadays that the economy continues to grow, the consumption of all those million people who enjoy the new minimum wage helps to improve the economy and doesn't harm it.… But the most important thing is that there are no budget consequences. Why? The Ministry of finance claims it will cost 230 million shekels. But those million people who will get the extra 140 shekels, most of them work in the business sector and not for the government. They won't buy diamonds in Paris or a house in Manhattan with this money, they will use it to purchase inside the Israeli market, which means the Ministry of finance gets taxes…"
>
> –Amir Peretz , in the 75th Session of the 17th Knesset, November, 2007

Figure 1: The Minimum Wage as a Percentage of the Average Wage, and the Statutory Minimum Wage Floor as a Percentage of the Average Wage



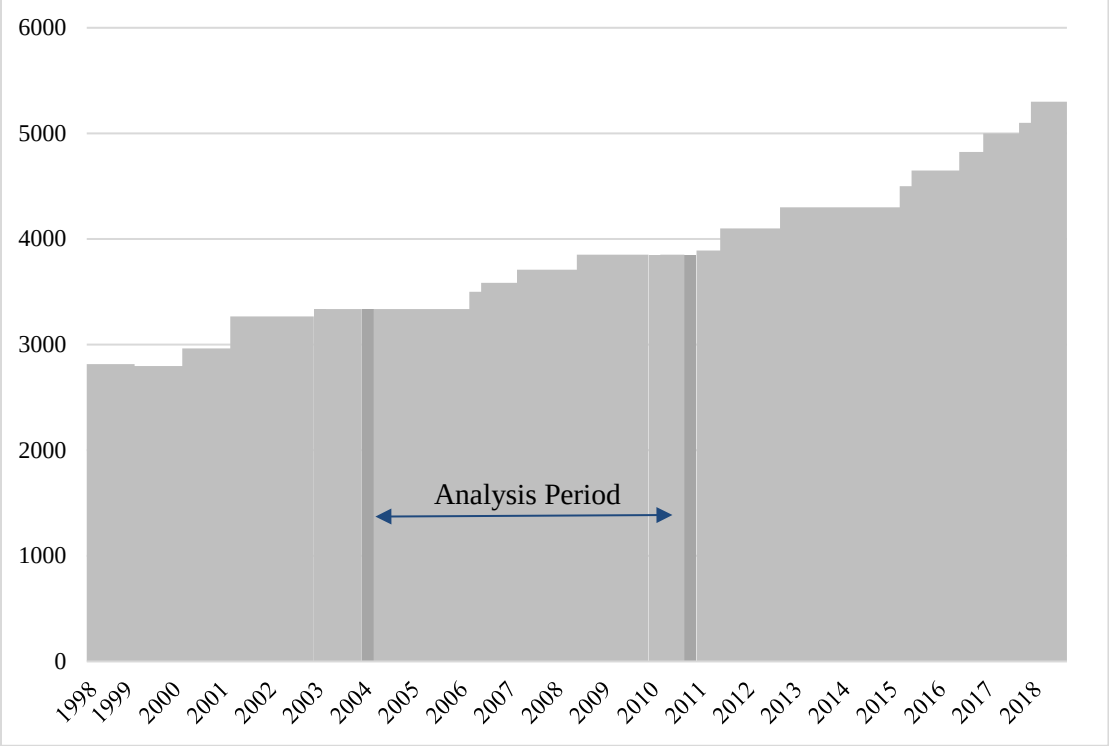
Note: Average wage is computed by the CBS based on administrative records provided by the National Insurance Institute, covering the entire economy. It includes both full-time and part-time jobs.

Figure 2: Evolution of the Statutory Minimum Wage in Israel in Analysis Period



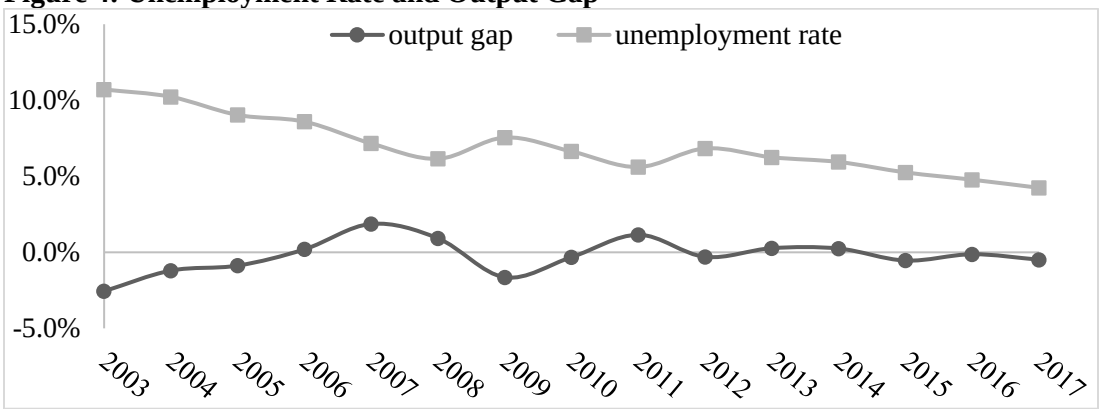
The minimum wage is in NIS per month, at current prices, based on full-time work.

Figure 3: Longer-Term Evolution of the Statutory Minimum Wage in Israel



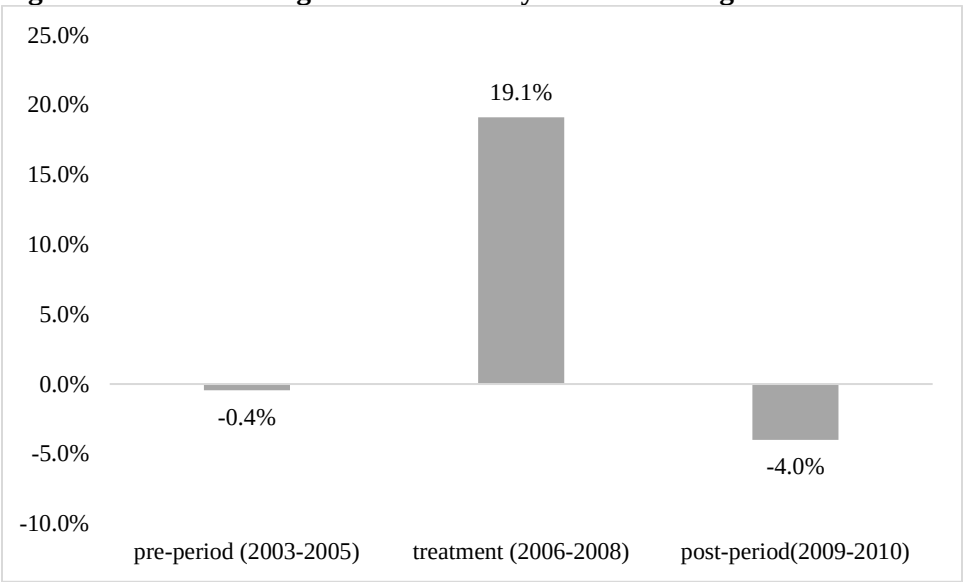
The minimum wage is in NIS per month, at current prices, based on full-time work.

Figure 4: Unemployment Rate and Output Gap



Notes: The authors calculated the output gap by applying Hodrick-Prescott filter to quarterly national accounts series for GDP. Output Gap is calculated as part of the macroeconomic forecasting process in the Israeli Ministry of Finance and serves as a measure of slack in the economy. OECD publishes similar figures for the Israeli economy as part of the OECD Economic Outlook.

Figure 5: Percent Change in Real Monthly Minimum Wage



Notes: The real minimum wage is in NIS per month (deflated by the CPI), based on full-time work.

Figure 6: Distribution of Company-Year Observations in the Estimation Sample, According to *FMW* Bins

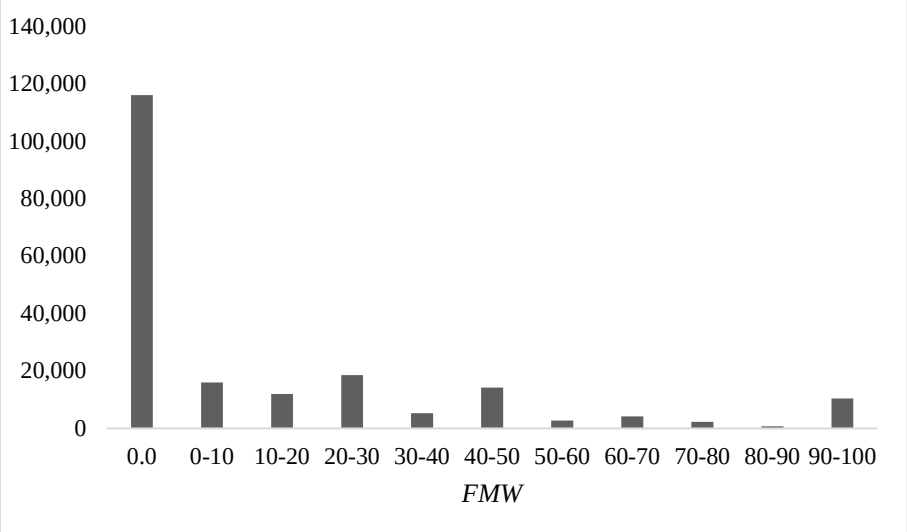


Figure 7: Share of One Worker Firms, According to *FMW* Bins

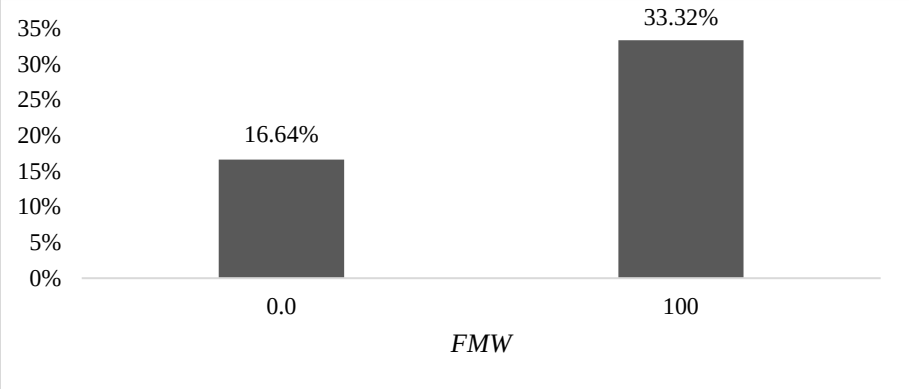


Figure 8: Employment per Firm, According to *FMW* Bins

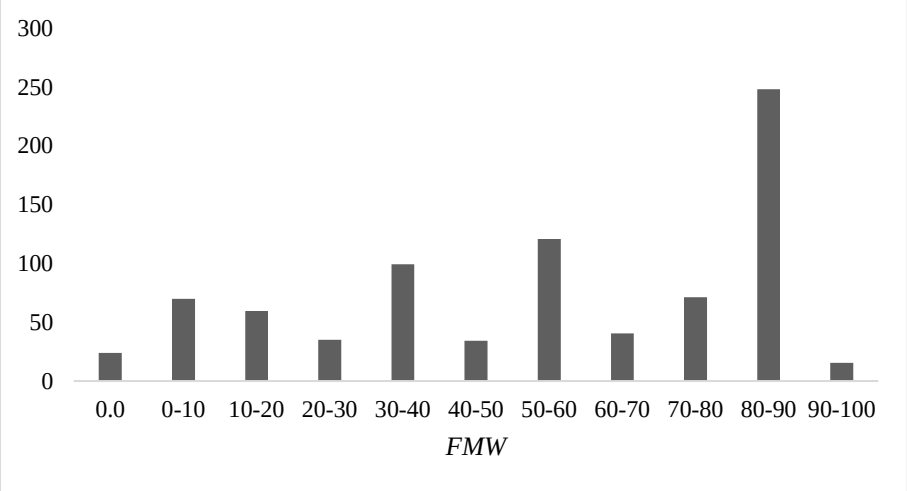
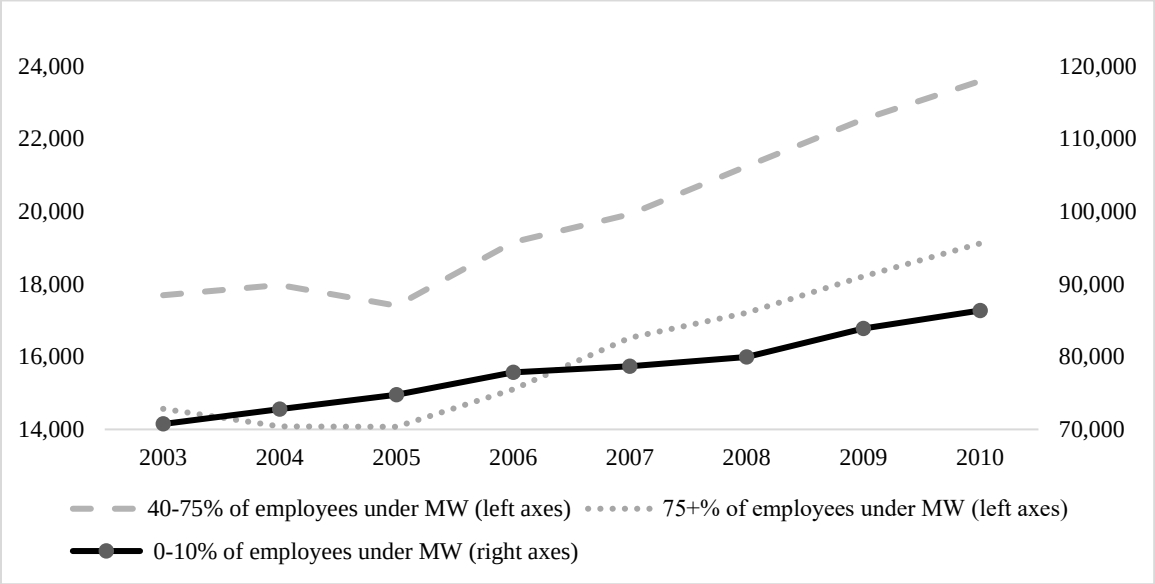
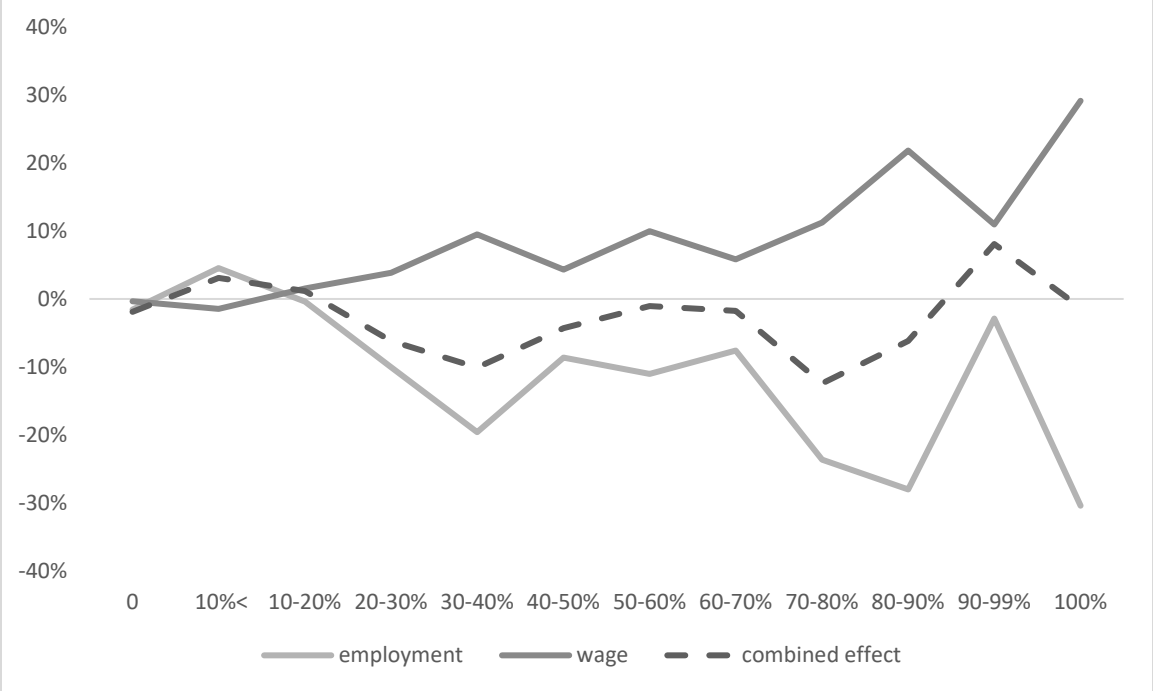


Figure 9: Wage Trends for Workers in Firms with Low and High Initial Fractions of Minimum Wage (*FMW*) Workers, 2003-2010



Note: Annual wages in NIS.

Figure 10: Employment and Wage Changes following Minimum Wage Hike by *FMW* Bins, % Change, 2004-2005 to 2009-2010



Note: Wage growth and combined effect are in real terms.

Table 1: Variables Used in Study

Variable	Description
Company data	
Profits	Taxable corporate income from all sources including reimbursement of owner's salary (1,000's NIS/year)
IHS(π)	Inverse hyperbolic sine (IHS) transformation of corporate income variable, defined as: $\sinh^{-1}(\text{income}) = \log[\text{income} + (\sqrt{\text{income}^2 + 1})]$
Profitability	Corporate income/sales (used for sample restriction)
Initial profits: - Low - Medium-low - Medium - High	A dummy variables (1 or 0) for quartiles companies' profits. We ranked companies' profits in the pre period (2004-2005) and divided them into four quartiles.
Sector dummies	23 sector dummy variables
Employee data, matched to company	
Employment	Employee headcount at the company level (main position)
Log(employment)	Natural logarithm of employment per company in each year (main position)
FMW	Fraction of employees paid monthly wages at or below the post-hike minimum wage for 2009-2010 based only on employees who worked continuously throughout the full year on their main job, in 2005. The year 2005 is the last year before treatment and was chosen to abstract from responses to the minimum wage hike. *FMW* is measured on a 0-1 scale (although the charts present percentages for clarity).
POST	Post-treatment dummy variable for years 2009-2010 (vs. the 2004-2005 pre-treatment period)
Income variables	
Owners' income percentile (IP) in 2005	Percentiles of business owners' incomes in the total income distribution of business owners and workers, in 2005. The year 2005 is the last year before treatment and was chosen to abstract from responses to minimum wage hike.
Workers' income percentile (IP) in 2005	Percentiles of workers' incomes in the total income distribution of business owners and workers, in 2005.
Weighted owners' income percentile by company (IP) in 2005	After we calculated owners' income percentile (*IP*) in 2005 at the individual-level, we calculated a weighted average, by percentage of ownership, of *IP* for each company.

NIS = New Israeli Shekels. The sectors are: manufacturing (mining, food production, textiles, paper products and , furniture, chemical products, mineral and metal products, electronics and medical, diamonds); agriculture; high tech; electricity and water supply; construction; wholesale and retail trade; accommodation services and restaurants; transport and communications; financial institutions; real estate; computer and related activities; R&D; manpower; security and cleaning; education; health services and social work; communities and other social and personal services; and other business activities.

Table 2: Construction of Analysis Sample, and Descriptive Statistics

Sample	Number of company-observations	Number of employees-observations on the main job	Employees per company (min; median; mean; max)	Profitability (min; median; mean; max)	*FMW* (min; median; mean; max)
Full sample of companies matched to employees, 2004-2010	658,804	21,719,245	(1; 6; 33.48; 36,387)	(-35,331,478; 0.08; -1,667.6; 9,892,492)	(0.00; 0.00; 0.20; 1.00)
Exclude government sector	654,159	19,668,656	(1; 6; 30.54; 32,606)	(-35,331,478; 0.08; -1,676.2; 9,892,492)	(0.00; 0.00; 0.20; 1.00)
Exclude non-profits	593,865	17,185,309	(1; 6; 29.35; 32,606)	(-35,331,478; 0.09; -1,778.3; 9,892,492)	(0.00; 0.00; 0.18; 1.00)
Exclude companies in liquidation	588,484	17,128,975	(1; 6; 29.51; 32,606)	(-35,331,478; 0.09; -1,793.8; 9,892,492)	(0.00; 0.00; 0.18; 1.00)
Exclude companies likely to be holding companies based on extreme profitability measures	542,583	16,358,953	(1; 7; 30.53; 32,606)	(-1; 0.09; 0.15; 1)	(0.00; 0.00; 0.18; 1.00)
Exclude companies established after 2005	519,050	16,018,885	(1; 7; 31.17; 32,606)	(-1; 0.09; 0.16; 1)	(0.00; 0.00; 0.18; 1.00)
Exclude companies with no wage data in 2005	356,893	13,120,034	(1; 8; 36.85; 32,606)	(-1; 0.10; 0.16; 1)	(0.00; 0.00; 0.18; 1.00)
Exclude company-observations in 2006-2008 (treatment period)	202,187	7,255,846	(1; 8; 35.97; 29,694)	(-1; 0.09; 0.15; 1)	(0.00; 0.00; 0.18; 1.00)

Note: Pre-treatment years are 2004-2005 and post-treatment years are 2009-2010.

Table 3: Number of Observations Per Year

Year	Number of companies	Number of employees at main position
2004	55,159	1,802,782
2005	57,520	1,945,423
2009	45,955	1,738,612
2010	43,553	1,769,029

Table 4: Descriptive Statistics of the Estimation Sample, 2004-2005 and 2009-2010

Variable	N	Median	Mean	Std. Dev.	Minimum	Maximum
Profits, thousands NIS	202,187	195	1,282	40,859	-1,610,081	8,840,595
IHS(π)	202,187	5.95	4.11	4.80	-14.98	16.69
Profitability	202,187	0.09	0.15	0.27	-1.00	1.00
Groups of initial profits:	202,187					
Low		0	0.23	0.42	0	1
Medium-low	202,187	0	0.24	0.43	0	1
Medium	202,187	0	0.26	0.44	0	1
High	202,187	0	0.27	0.44	0	1
Employment	201,742	8.00	35.97	254.51	1	29,694
Log(employment)	201,742	2.08	2.15	1.44	0.00	10.30
FMW	202,187	0	0.18	0.28	0	1
POST	202,187	0	0.44	0.50	0	1
Owners' income percentile (*IP*) in 2005	58,384	95	90	15	0	100
Workers income percentile (*IP*) in 2005	1,269,078	48	48	28	0	99
Weighted owners income percentile by company (*IP*) in 2005	44,866	94	90	14	0	99

Table 5: Regression Estimates for Minimum Wage Effect on Log Employment, Based on Fraction Affected by Minimum Wage (*FMW*), 2004-2005 and 2009-2010

Variables	(1)	(2)
Intercept	2.111^{***}	2.165^{***}
	(0.007)	(0.071)
FMW	0.109^{***}	-0.084^{***}
	(0.022)	(0.020)
POST	0.068^{***}	0.023
	(0.005)	(0.063)
FMW × *POST*	-0.122^{***}	-0.098^{***}
	(0.019)	(0.018)
Sector dummies and sector dummies × *POST*	no	yes
Adj. R^2	0.001	0.118
N	201,742	201,742

Notes: Dependent variable is log(employment) per firm in each year. Levels of significance: $10\%^{*}$, $5\%^{**}$, $1\%^{***}$. Standard errors are clustered at the firm level. *FMW* is measured on a 0-1 scale in the regressions.

Table 6: Regression Estimates for Minimum Wage Effect on Log Employment, with Separate *FMW* Bins, 2004-2005 and 2009-2010

Variables	(1)	(2)	(3)
Intercept	1.687***	1.843***	1.828***
	(0.007)	(0.061)	(0.060)
FMW >0-20%	1.763***	1.625***	1.623***
	(0.014)	(0.014)	(0.014)
FMW 20-40%	1.012***	0.878***	0.884***
	(0.016)	(0.015)	(0.015)
FMW 40-60%	0.588***	0.441***	0.447***
	(0.020)	(0.018)	(0.018)
FMW 60-80%	1.066***	0.817***	0.829***
	(0.030)	(0.027)	(0.027)
FMW 80-100%	-0.336***	-0.414***	
	(0.025)	(0.022)	
FMW 80-94%			1.857***
			(0.077)
FMW 94-100%			-0.633***
			(0.020)
FMW 0%	…	…	…
POST	0.087***	-0.058	-0.057
	(0.006)	(0.059)	(0.059)
FMW >0-20% × *POST*	-0.137***	-0.140***	-0.140***
	(0.010)	(0.010)	(0.011)
FMW 20-40% × *POST*	-0.207***	-0.191***	-0.192***
	(0.124)	(0.012)	(0.012)
FMW 40-60% × *POST*	-0.203***	-0.180***	-0.181***
	(0.017)	(0.016)	(0.016)
FMW 60-80% × *POST*	-0.259***	-0.234***	-0.236***
	(0.026)	(0.025)	(0.025)
FMW 80-100% × *POST*	-0.042*	-0.029	
	(0.022)	(0.021)	
FMW 80-94%× *POST*			-0.100*
			(0.058)
FMW 94-100%× *POST*			-0.046**
			(0.021)
FMW 0% × *POST*	…	…	…
Sector dummies and sector dummies × *POST*	no	yes	yes
Adj. R^2	0.205	0.284	0.298
N	201,742	201,742	201,742

Notes: Dependent variable is log(employment) per firm in each year. Levels of significance: 10%*, 5%**, 1%***. Standard errors are clustered at the firm level. *FMW* is measured on a 0-1 scale in the regressions. Specification (3) splits the top *FMW* 80-100% bin into two groups that are more homogenous, as explained in the text.

Table 7: Regression Estimates of Minimum Wage Effect on Profits (*IHS*(π)), Based on Fraction Affected by Minimum Wage (*FMW*), 2004-2005 and 2009-2010

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	Full sample	Sample: low initial profits	Sample: Low-medium initial profits	Sample: Medium initial profits	Sample: High initial profits
Intercept	7.828***	7.931***	-3.400***	4.912***	6.227***	7.722***
	(0.008)	(0.057)	(0.173)	(0.042)	(0.025)	(0.095)
FMW	0.155***	0.179***	0.946***	-0.324***	-0.060***	-0.582***
	(0.022)	(0.023)	(0.058)	(0.014)	(0.009)	(0.032)
POST	-1.416***	-2.022***	4.737***	-1.320***	-1.605***	-1.832***
	(0.034)	(0.224)	(0.495)	(0.357)	(0.374)	(0.536)
FMW × *POST*	-0.749***	-0.795***	-1.784***	-0.143	-0.350***	-0.086
	(0.068)	(0.070)	(0.144)	(0.106)	(0.124)	(0.171)
Initial profits dummies	yes	yes	no	no	no	no
Initial profits × *POST*	yes	yes	no	no	no	no
Sector dummies and sector dummies × *POST*	no	yes	yes	yes	yes	yes
Adj. R^2	0.551	0.555	0.293	0.045	0.052	0.069
N	202,187	202,187	47,146	48,082	52,332	54,627

Notes: Dependent variable is *IHS(π)* per firm in each year. Levels of significance: 10%*, 5%**, 1%***. Standard errors are clustered at the firm level. *FMW* is measured on a 0-1 scale in the regressions.

Table 8: Regression Estimates of Minimum Wage Effect on Profits (*IHS*(π)), Based on Fraction Affected by Minimum Wage (*FMW*), with Separate *FMW* Bins, 2004-2005 and 2009-2010

Variables	(1)	(2)
Intercept	7.874***	7.977***
	(0.009)	(0.056)
FMW >0-20%	-0.078	-0.072***
	(0.019)	(0.019)
FMW 20-40%	-0.115***	-0.110***
	(0.017)	(0.016)
FMW 40-60%	-0.041**	-0.025
	(0.019)	(0.019)
FMW 60-80%	-0.061*	-0.031
	(0.031)	(0.031)
FMW 80-100%	0.334***	0.341***
	(0.028)	(0.029)
FMW 0%	…	…
POST	-1.490***	-2.117***
	(0.037)	(0.224)
FMW >0-20% × *POST*	0.087	0.164***
	(0.059)	(0.059)
FMW 20-40% × *POST*	0.022	0.054
	(0.056)	(0.064)
FMW 40-60% × *POST*	-0.201***	-0.206***
	(0.064)	(0.064)
FMW 60-80% × *POST*	-0.456***	-0.476***
	(0.106)	(0.107)
FMW 80-100% × *POST*	-0.940***	-0.987***
	(0.083)	(0.084)
*FMW*00 × *POST*	…	…
Initial profit dummies	yes	yes
Initial profit dummies × *POST*	yes	yes
Sector dummies and sector dummies × *POST*	no	yes
Adj. R^2	0.552	0.555
N	202,187	202,187

Levels of significance: 10%*, 5%**, 1%***. Standard errors are clustered at the firm level.

Table 9: Regression Estimates of Minimum Wage Effect on Profits (*IHS*(π)), Based on Income Percentile for Incomes of Business Owners, 2004-2005 and 2009-2010

Variables	(1)	(2)
Intercept	7.802***	7.899***
	(0.055)	(0.227)
Income percentile (IP)	-0.121**	-0.143***
	(0.057)	(0.057)
POST	-3.523***	-3.973***
	(0.174)	(0.281)
Income percentile (IP) × *POST*	2.461***	2.415***
	(0.177)	(0.177)
Initial profit dummies	yes	yes
Initial profit dummies × POST	yes	yes
Sector dummies and sector dummies × *POST*	no	yes
Adj. R^2	0.551	0.553
N	155,647	155,647

Levels of significance: 10%*, 5%**, 1%***. Standard errors are clustered at the firm level. (Clustering at the owner level is complicated because there can be multiple and overlapping owners.) *IP* is measured on a 0-1 scale in the regressions.

Table 10: **Income Percentiles of Business Owners and Workers, Individual and Family, by *FMW*, 2005**

	(1)	(2)	(3)	(4)
FMW	Business owners' income percentile	Workers' income percentile	Business owners' family income percentile	Workers' family income percentile
0	88	77	71	57
< 10%	94	77	82	57
10-20%	87	60	72	44
20-30%	85	54	69	40
30-40%	81	48	63	37
40-50%	79	44	60	35
50-60%	80	38	61	31
60-70%	78	38	56	30
70-80%	78	38	57	28
80-90%	79	34	53	25
90-100%	74	36	48	24
Total	87	68	68	49

Note: Individual figures represent approximate rank of column (5) in Tables 11 and 12. Family figures represent approximate rank of column (10) in Table 11. Family income represents combined income of both married spouses in the year 2005. Annual owner or worker wages below 6,000 NIS were omitted from calculation, as these can reflect small components of income that are not labor income from the main job. The rank was calculated based on the family distribution including both owners' and workers' families.

Table 11: **Descriptive Statistics for Family Income by *FMW*: Married Business Owners and Workers, 2005**

A. Owners												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FMW	N	Average age	% female	# children under 18 in 2005	Owners income	Spouse age	Spouse % female	Annual spouse income	% of spouses working	Family income	Family income relative to average in $0<FMW\leq 0.1$ range	Owner/ spouse income ratio
0	28,904	49.85	4.4%	2.33	235,192	46.9	95.7%	116,235	64.3%	312,083	68%	3.1
< 10%	3,419	52.66	2.7%	2.32	372,911	49.4	97.3%	140,150	59.4%	458,600	100%	4.5
10-20%	5,181	50.92	3.4%	2.34	230,751	47.7	96.6%	104,015	63.7%	298,226	65%	3.5
20-30%	3,086	49.50	4.5%	2.38	202,910	46.4	95.5%	101,814	66.1%	269,795	59%	3.0
30-40%	3,712	49.05	4.4%	2.44	168,659	45.8	95.7%	91,188	66.9%	229,877	50%	2.8
40-50%	3,962	49.26	5.1%	2.38	159,372	46.1	95.0%	88,750	67.4%	221,902	48%	2.7
50-60%	801	48.37	4.4%	2.45	166,414	45.0	95.7%	86,703	63.8%	223,853	49%	3.0
60-70%	1,149	48.63	5.0%	2.48	159,633	45.2	95.1%	82,982	64.2%	215,152	47%	3.0
70-80%	628	47.16	6.2%	2.64	149,760	44.1	93.9%	87,533	64.3%	206,732	45%	2.7
80-90%	258	45.96	5.8%	2.63	168,803	42.3	94.1%	92,481	53.9%	217,249	47%	3.4
90-100%	2,728	50.83	6.0%	2.42	134,650	47.7	94.2%	91,137	62.0%	198,334	43%	2.4
B. Workers												
FMW	N	Average age	% female	# children under 18 in 2005	Annual wage	Spouse age	Spouse % female	Annual spouse income	% of spouses working	Family income	Family income relative to $0<FMW\leq 0.1$ range	Worker/ spouse income ratio
0	228,395	40.72	29.3%	1.44	131,069	39.1	66.1%	104,518	67.4%	207,498	102%	1.9
< 10%	263,140	40.06	34.5%	1.35	130,888	38.6	61.6%	98,712	70.8%	202,744	100%	1.9
10-20%	100,238	40.04	45.7%	1.35	73,505	39.4	47.5%	89,811	65.1%	138,431	68%	1.3
20-30%	60,511	38.54	46.5%	1.26	62,541	37.9	47.0%	85,500	65.1%	122,979	61%	1.1
30-40%	60,808	38.47	50.1%	1.22	53,218	38.0	42.6%	81,848	64.6%	112,959	56%	1.0
40-50%	37,324	38.42	48.7%	1.27	49,519	38.2	43.6%	83,757	63.0%	107,895	53%	0.9
50-60%	19,391	38.35	52.4%	1.22	41,239	38.3	39.4%	74,144	62.3%	93,238	46%	0.9
60-70%	23,041	39.63	59.0%	1.26	38,086	39.9	33.6%	74,344	63.7%	89,567	44%	0.8
70-80%	10,339	38.18	55.0%	1.32	37,129	38.4	34.8%	73,247	60.2%	85,074	42%	0.8
80-90%	9,759	40.66	66.7%	1.40	29,494	41.2	24.1%	71,446	59.8%	74,276	37%	0.7
90-100%	18,561	43.81	70.1%	1.32	28,652	44.1	21.9%	79,643	58.7%	74,137	37%	0.6

Notes: Annual owner or worker wages below 6,000 NIS were omitted from calculation. Family income is calculated by combining spouses' incomes.

Table 12: **Descriptive Statistics by *FMW:* Single Business Owners and Workers, 2005**

A. Owners					
	(1)	(2)	(3)	(4)	(5)
FMW	N	Age	% female	# children under 18 in 2005	Annual owner wage
0	5,347	47.38	21.5%	1.80	191,728
< 10%	491	53.35	25.7%	1.79	393,442
10-20%	766	49.20	23.5%	1.82	199,852
20-30%	489	46.60	26.6%	1.89	160,847
30-40%	667	47.07	25.8%	1.81	142,512
40-50%	773	45.72	25.5%	1.86	124,418
50-60%	150	44.31	19.3%	2.00	151,856
60-70%	236	43.35	23.7%	1.79	105,619
70-80%	123	43.11	28.5%	2.21	113,148
80-90%	62	39.81	16.1%	2.58	108,605
90-100%	742	45.48	24.4%	1.76	81,367
B. Workers					
FMW	N	Age	% female	# children under 18 in 2005	Annual wage
0	100,316	32.26	37.5%	0.36	72,937
< 10%	111,393	32.37	44.3%	0.33	75,927
10-20%	62,031	31.12	47.8%	0.31	43,042
20-30%	48,414	28.90	44.9%	0.23	37,045
30-40%	52,701	28.09	47.6%	0.22	30,853
40-50%	35,770	27.51	46.6%	0.20	27,958
50-60%	21,264	27.11	47.5%	0.21	24,578
60-70%	22,865	28.37	55.2%	0.24	23,465
70-80%	10,429	27.75	49.9%	0.22	23,289
80-90%	8,215	31.61	60.4%	0.33	20,296
90-100%	12,312	38.46	71.6%	0.44	21,396

Notes: Annual owner or worker wages below 6,000 NIS were omitted from calculation.