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ASSESSING THE POSSIBLE ANTIPOVERTY EFFECTS OF RECENT RISES IN AGE-SPECIFIC MINIMUM WAGES IN NEW ZEALAND

by Tim Maloney* and Gail Pacheco

Real minimum wages increased by nearly 33 percent for adults and 123 percent for teenagers in New Zealand between 1999 and 2008. Where fewer than 2 percent of workers were being paid a minimum wage at the outset of this sample period, more than 8 percent of adult workers and 60 percent of teenage workers were receiving hourly earnings close to the minimum wage by the end of this period. These policy changes provide a unique opportunity to estimate the effects of the minimum wage on poverty. Although minimum wage workers are more likely to live in the poorest households, they are relatively widely dispersed throughout the income distribution. This is particularly true of teenage minimum wage workers. Furthermore, low-income households often do not contain any working members. We estimate that a 10 percent increase in minimum wages, even without a loss in employment or hours of work, would lower the relative poverty rate by less than one-tenth of a percentage point.

JEL Codes: I380, J380, J880

Keywords: minimum wage, poverty, New Zealand

Introduction

This study takes advantage of substantial and varied changes to minimum wages in New Zealand (NZ) since 2000 to better understand their potential importance for reducing poverty in this country. We develop a consistent method for identifying minimum wage workers in our annual cross sectional data, and show how both the incidence of minimum wage work and the characteristics of these individuals have changed, with large effective increases in both teenage and adult minimum wages over our sample period of 1997 to 2008. More importantly, we estimate where these minimum wage workers are located in the income distribution and how this has changed over our sample period. We end with a series of policy simulations designed to show the possible consequences of a 10 percent increase in real minimum wages for a specific poverty measure across various household populations.

The next section of this paper discusses both the recent changes to statutory minimum wages in NZ, and the context of these changes relative to both the contemporary political and economic history of this country. Section 2 describes the data used in this study, surveys the literature over alternative definitions of minimum wage work, and analyzes our empirical findings on the incidence of the

Notes: Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. Results presented in this study are the work of the authors, not Statistics New Zealand. The analysis in the paper reflects the authors' views and not those of Statistics New Zealand.

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minimum wage in NZ between 1997 and 2008. Sections 3 and 4 examine descriptive statistics and regression results on the associations between effective minimum wages and both the dispersion of minimum workers across the income distribution and the potential incidence of minimum wage work among all workers at various points in this income distribution. Section 5 uses the data from our sample period to estimate how a 10 percent increase in minimum wages would affect the percentages of households living below 50 percent of median income. These policy simulations are conducted for different assumptions about the possible detrimental effects on the earnings of minimum wages from a reduction in hours of work, and for different household populations. Finally, Section 6 draws some conclusions from this study.

1. Recent History of the Minimum Wage in NZ

Table 1 shows the legislated changes to nominal minimum wages in NZ between September 1990 and April 2008. This sample period spans the last legislated changes to the minimum wage prior to the general election victories of the more conservative National Party in both November 1990 and November 2008.

In September 1990, teenagers were exempt from the minimum wage. Adults aged 20 and over faced a minimum wage of $6.125 (or $245 for a 40-hour workweek). A centralized wage-setting system was still in place at this time, characterized by compulsory unionism and national awards with blanket coverage provisions (largely occupational minimal pay rates negotiated by a tripartite group involving trade unions, employer organizations and the government).

Over the subsequent nine years in office, the labor market policies of the National Government can be summarized by two key decisions. The first policy

TABLE 1

Changes to Legislated Minimum Wages in New Zealand, September 1990 to April 2008

Date of Legislated Change	Age Group		
	Ages 16–17	Ages 18–19	Ages 20+
September 1990	**NA**	**NA**	$6.125
March 1994	$3.68	$3.68	$6.125
March 1995	$3.75	$3.75	$6.25
March 1996	$3.83	$3.83	$6.375
March 1997	$4.20	$4.20	$7.00
March 2000	$4.55	$4.55	$7.55
March 2001	$5.40	$7.70	$7.70
March 2002	$6.40	$8.00	$8.00
March 2003	$6.80	$8.50	$8.50
April 2004	$7.20	$9.00	$9.00
March 2005	$7.60	$9.50	$9.50
March 2006	$8.20	$10.25	$10.25
April 2007	$9.00	$11.25	$11.25
April 2008	$12.00*	$12.00	$12.00

Notes: No minimum wage existed for teenagers prior to March 1994.

*This was the minimum wage for 16- and 17-year-olds after 3 months or 200 hours of work accumulated across all employers following the 16th birthday. A lower minimum wage existed for this age group (80% of this figure or $9.60) if they were otherwise classified as "New Entrants."

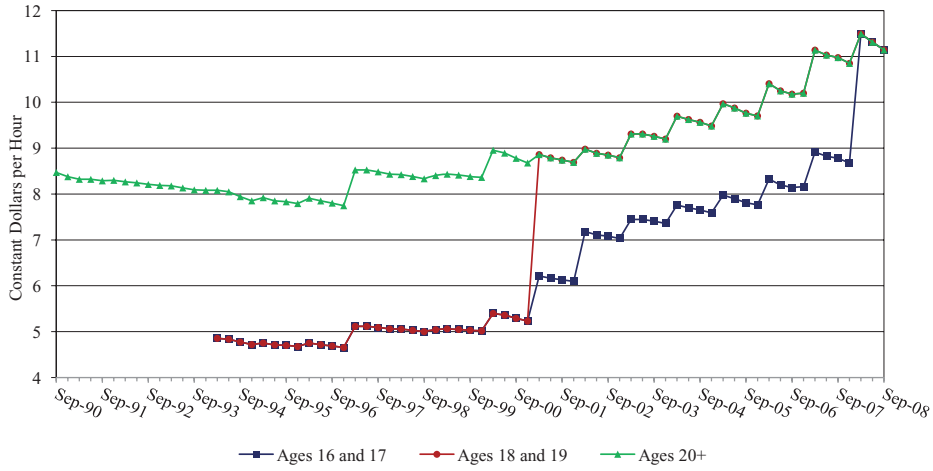

Figure 1. Adult and Teenage Minimum Wages in Constant Dollars, September 1990 to September 2008

Notes: No minimum wage existed for teenagers prior to March 1994. See the notes at the bottom of Table 1 for an explanation for the different minimum wages that face 16- and 17-year-olds, beginning in April 2008. All legislated hourly minimum wage rates in this figure were adjusted to constant dollars using the Consumer Price Index with a base period of June 2006.

was immediate and highly visible. The Employment Contracts Act (ECA) was implemented in May 1991. It abolished the remnants of the national awards system, compulsory unionism, and other labor market protections. The second policy was more gradual, less noticeable, and somewhat contradictory. Partly in response to the removal of basic labor market protections under the ECA, the National Government introduced a minimum wage for workers aged 16–19 in March 1994. This teenage minimum wage ($3.68) was set at 60 percent of the adult rate. Yet, during the 1990s, the adult minimum wage was allowed to erode slightly relative to both inflation and the general wage level. As can be seen in Figures 1 and 2, the three legislated increases in the adult minimum wage in 1995, 1996, and 1997 meant that the effective adult minimum wage was lower in September 1999 than it was in September 1990. Over this nine-year period, the adult minimum wage fell by 1.1 percent relative to the Consumer Price Index (CPI) and by 8.7 percent relative to average, ordinary-time hourly earnings from the Quarterly Employment Survey (QES). Thus, the National Government extended minimum wage protection to teenagers, but allowed this basic wage floor to erode at least slightly in real terms and relative to the average wage.

The Labour Party won the general election in November 1999, and continued in power until its election defeat in November 2008. The Labour Government quickly replaced the ECA with the Employment Relations Act (ERA) in October 2000. The ERA promoted collective and good-faith bargaining, re-established the primacy of trade unions in collective contract negotiations, and encouraged multi-employer bargaining. However, the ERA did not bring back compulsory unionism, the awards system, and other labor market protections. Perhaps as a

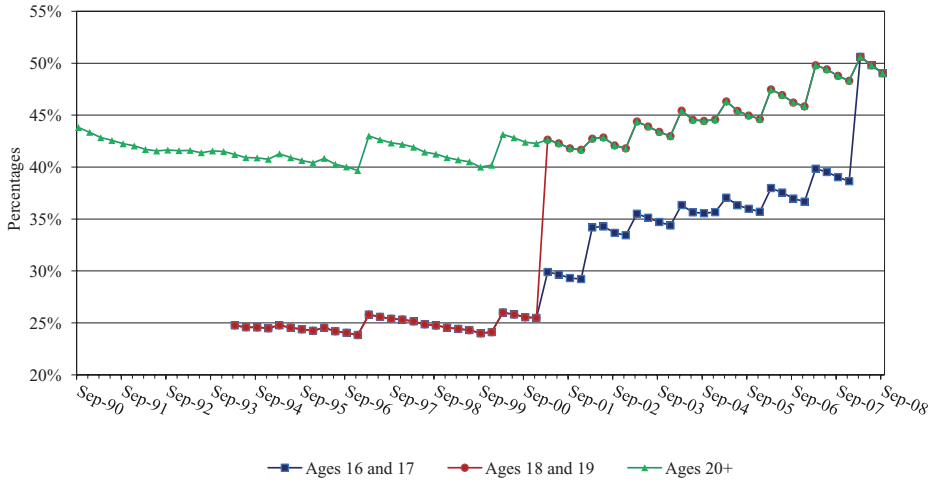

Figure 2. Adult and Teenage Minimum Wages in Relative to Average Hourly Earnings, September 1990 to September 2008

Notes: No minimum wage for teenagers prior to March 1994. See the notes at the bottom of Table 1 for an explanation for the different minimum wages that face 16- and 17-year-olds beginning in April 2008. All legislated hourly minimum wage rates in this figure were divided by Average Ordinary-Time Hourly Earnings taken from the Quarterly Employment Survey.

consequence of the decision not to return to a more formal centralized wage-setting system, the Government initiated a program to substantially lift minimum wages. Annual increases in the minimum wage began in 2000 (see Table 1). Over the nine-year period between September 1999 and September 2008, the adult minimum wage increased by 32.9 percent relative to the CPI and 22.6 percent relative to average, ordinary-time hourly earnings (see Figures 1 and 2).

The Labour Government implemented even larger changes in the minimum wages faced by teenagers. Recall that the teenage minimum wage was set at 60 percent of the adult rate by the National Government, beginning in March 1994. Labour completely abolished this subminimum wage for 18- and 19-year-olds beginning in March 2001, extending the adult rate to all workers aged 18 and over from this date. This resulted in a substantial increase in the effective minimum wage for this age group. Between September 1999 and September 2008, the minimum wage for 18- and 19-year-olds increased by 122.8 percent relative to the CPI and by 104.3 percent relative to average, ordinary-time hourly earnings.

Unlike the immediate and substantial increase in the minimum wage for older teenagers in March 2001, the minimum wage for 16- and 17-year-olds was gradually raised to parity with the adult rate from this date. The minimum wage for younger teenagers was lifted to 70 percent of the adult minimum in March 2001, 80 percent in March 2002, and finally to 100 percent in April 2008. It should be noted, however, that 16- and 17-year-olds who are deemed to be "new entrants" or in qualified training programs continue to face a minimum wage set at 80 percent of the adult rate after April 2008. However, this subminimum wage disappears once 16- or 17-year-olds have accumulated 3 months or 200 hours of work experience

across all employers since their 16th birthday or complete their training programs. In summary, there was a similar relative rise in the eventual minimum wage across all teenagers over this period. Only the timing was different. The largest increase occurred for 18- and 19-year-olds in 2001, while the same increase was spread over the 2001–08 period for 16- and 17-year-olds.

The recent history of minimum wage policy in NZ offers an excellent opportunity to estimate various impacts that such wage floors might have on the labor market. The "baseline period" between 1990 and 1999 was one of relative stability in the effective minimum wage, except for the introduction of a teenage rate in 1994. The "experimental period" between 2000 and 2008 saw a steady increase in the minimum wage, with substantial differences in the size and timing of these adjustments across distinct age groups. All of this was done during a period with a relatively decentralized wage-setting system where such wage floors might be expected to have a substantial influence on labor market outcomes.

2. Conceptual Issues and Descriptive Statistics on Minimum Wage Incidence

Data from the annual Income Supplements (IS) to the Household Labour Force Surveys (HLFS) are used in this study to estimate the possible effects of the minimum wage on income inequality. The HLFS is a survey of the resident population conducted in the March, June, September, and December quarters of each year. It currently surveys about 16,000 households nationwide. The Income Supplement, which solicits detailed information on sources and amounts of income received by household members in a nationally-representative survey, has been added to the June HLFS since 1997. The period from 1997 to 2008 covers three years prior to the recent changes in the minimum wage, along with the remaining years over which these changes have been gradually introduced. We begin by asking how these recent policy changes have affected the overall incidence of working for the minimum wage, and how these incidence rates vary across different demographic groups.

One of the first practical issues to consider is how to define a minimum wage worker. One approach would be to base this classification on someone receiving an hourly wage rate that is exactly equal to the statutory minimum wage for that person's age group at the time of the survey. This is rarely done in practice, because the hourly wage rate is often not reported (and often not even known) by a salaried worker. It must be estimated from earnings and hours worked over a specific period of time (e.g., weekly, fortnightly, monthly, or annually). This increases the possibility of measurement error due to the misreporting of either earnings or hours of work.

Previous studies have defined minimum wage workers in a number of ways. Haugen and Mellor (1990) used data from the Current Population Survey (CPS) in the United States for this purpose. The CPS asks individuals to report their hourly wage if this is how they are paid. The authors defined minimum wage workers as those receiving an hourly wage exactly equal to or less than the statutory minimum wage. They found that approximately one-third of these individuals reported receiving a wage rate below the minimum wage. The authors concluded that, even

among wage earners, there is reason to suspect some measurement error. This approach of defining minimum wage workers as those earning exactly the minimum wage and below has been replicated in a series of annual reports on the characteristics of U.S. minimum wage workers (see, e.g., Bureau of Labor Statistics, 2007).

Other authors have adopted alternative ways of defining minimum wage workers. Dolado *et al.* (1996) summarize a large number of studies on the impact of minimum wages in Europe. Without being very specific, they claim that minimum wage workers are generally defined as being ". . . paid at or close to the minimum wage" (p. 325). Presumably this definition allows for some range of values on either side of the legal minimum wage. Bernstein and Schmitt (2000) define minimum wage workers as those receiving hourly earnings exactly equal to the minimum wage and up to one dollar above this amount. This suggests that the authors consider workers reporting an hourly wage below the legal minimum as either an invalid wage observation, or at least an invalid observation of a true "minimum wage worker" (e.g., possibly due to exemptions from the federal minimum wage). Finally, Hyslop and Stillman (2007) divide the low end of the wage distribution into three distinct groups: those receiving an hourly wage rate less than the current minimum wage, exactly equal to the current minimum wage, and above this year's minimum wage but below next year's minimum wage.

Thus, the literature provides a wide array of potential definitions for minimum wage workers. One consistent theme that runs across these studies is that some "margin of error" around the statutory minimum wage is needed to capture all minimum wage workers. Some authors seem to differ on which side of the minimum wage this margin of error should exist. Once we acknowledge that measurement error can occur in computing hourly earnings, however, there would seem to be little justification for it to be one-sided. Furthermore, we believe that some computed hourly earnings are so low that they most likely reflect substantial measurement error and may therefore not be legitimate observations of minimum wage work.

We believe that measurement error in computing hourly earnings necessitates the creation of "bands" around the legal minimum wage. In this study, we employ bands that are fixed in real dollar amounts over time, and are not dependent on future values of the minimum wage.[1] The issue that is impossible to resolve satisfactorily is the appropriate width of the bands.[2] We also need to recognize that our earnings data for this study are taken over a period of a few months following the increases in statutory minimum wages in NZ that occurred in either March or April. Some individuals may be reporting earnings in the June quarter that have

[1]For the purposes of defining who is a minimum wage worker in the present period, it would be problematic if this hinged on future values of the minimum wage. This might be appropriate for other considerations (e.g., who is at risk of employment loss at the next period), but it would make it difficult to get a consistent picture of how the characteristics of minimum wage workers are changing over time with the current minimum wage.

[2]There is an additional issue about whether or not these bands should be symmetric around the minimum wage. This largely depends on the nature of the measurement error that might make true minimum wage workers report hourly earnings below or above this legal minimum. Without being able to identify these various sources of measurement error, we simply choose to centre these bands on the legal minimum wage.

yet to be adjusted for the rise in the relevant minimum wage. For this reason, we choose three arbitrary bands set at 20-cent, 50-cent, and 100-cent intervals (measured in constant 2008 dollars) on either side of the previous and current, age-relevant minimum wage. Our main focus will be on the 50-cent band, but the results from the narrower and wider bands will be reported to gauge the robustness of our findings.

Table 2 displays our findings on minimum wage incidence over the 12 years between 1997 and 2008. We have a total of 143,166 valid observations on workers over this period,[3] of which 4.8 percent can be defined as minimum wage workers using our 50-cent band. However, across the period from 1997 to 2008, this minimum wage incidence ranged from slightly over 1 percent in 1998 to just over 12 percent in 2008. If we compare the average incidence rates in the three-year periods of 1997–99 and 2006–08, the percentage of minimum wage workers increased six-fold from 1.63 percent to 10.03 percent.[4]

The next two columns in Table 2 report minimum wage incidence rates separately for teenage workers (aged 16–19) and adult workers (aged 20 or over). With the teenage minimum set at 60 percent of the adult rate through 2000, very few teenage workers were receiving the minimum wage over the first four years in our sample (ranging between 2 and 3.5 percent). Note that the teenage minimum wage was approximately 25 percent of average hourly earnings over this period (Figure 2). This is substantially lower than the effective minimum wage for teenagers in other countries, and suggests that the teenage minimum was not "binding" for the vast majority of teenage workers in this early period. As would be expected, the minimum wage incidence rate for adults was generally lower than that of teenagers. This was true even in the earlier period when the teenage minimum was set at 60 percent of the adult rate.

In 2001, the minimum wage was lifted to 100 percent of the adult rate for 18- and 19-year-olds and 70 percent of the adult rate for 16- and 17-year-olds. The impact on the minimum wage incidence rate for teenage workers was immediate and substantial. It increased more than six-fold from 3.46 percent in June 2000 to 21 percent in June 2001. In comparison, there was very little change in the adult incidence rate between these surveys. Further increases in minimum wages facing all teenagers by June 2008 meant that more than 60 percent of teenage workers could be classified as minimum wage workers by the end of our sample period.[5]

The increase in minimum wage incidence among adults was less dramatic, but still substantial. Recall that the adult minimum wage increased relative to the average hourly earnings by nearly 23 percent between 1999 and 2008. The percentage of adult workers receiving the minimum wage increased from an average

[3]We removed from our sample observations on individuals aged less than 16 and more than 65 years of age. In addition, we eliminated individuals reported to be disabled or retired, those not receiving positive earnings or working positive hours, the self-employed, those reporting to usually work more than 60 hours per week, and individuals reporting usual overtime weekly earnings or hours in excess of their usual regular weekly earnings or hours.

[4]We find similar increases in minimum wage incidence between the periods 1997–99 and 2006–08 if we use a narrower 20-cent band (0.99–6.82 percent) and a wider 100-cent band (3.13–14.82 percent).

[5]Minimum wage incidence rates for teenage workers in 2008 were 50.23 and 70.65 percent, using the alternative 20-cent and 100-cent bands, respectively.

TABLE 2

Minimum Wage Incidence across Demographic Groups, June 1997 to June 2008

	Estimated Percentages of Minimum Wage Workers												
Year	All	Teens: Aged 16–19	Adults: Aged 20+	Females	Males	Without Education Quals	With Education Quals	Maori or Pacific Islander	Other Ethnicities	Part Time	Full Time	Retail, Accommodation, Cafes or Restaurants	Other Industries
1997	2.73	2.71	2.73	3.14	2.31	4.61	2.14	4.92	2.32	4.87	2.14	4.27	2.39
1998	1.05	2.04	0.97	1.27	0.82	1.31	0.97	0.57	1.14	1.86	0.79	1.86	0.86
1999	1.12	2.57	1.01	1.18	1.05	1.86	0.89	1.55	1.04	2.30	0.75	1.79	0.98
2000	1.79	3.46	1.66	2.09	1.47	2.59	1.55	2.56	1.62	3.85	1.14	3.14	1.49
2001	3.07	21.00	1.74	3.60	2.53	3.77	2.87	3.59	2.97	7.09	1.89	7.78	2.05
2002	3.39	22.63	1.99	3.71	3.06	3.70	3.30	4.45	3.15	8.11	2.00	8.57	2.23
2003	3.64	24.45	2.11	4.52	2.74	5.20	3.23	5.17	3.30	9.43	1.94	9.82	2.18
2004	4.27	25.85	2.73	5.63	2.88	6.39	3.59	5.48	4.01	11.05	2.36	11.29	2.72
2005	4.26	27.23	2.67	5.69	2.80	6.07	3.73	5.32	4.03	11.62	2.32	12.09	2.59
2006	8.02	30.30	6.43	10.00	5.99	12.12	6.75	10.87	7.37	20.86	4.79	18.88	5.78
2007	10.02	38.83	8.01	12.83	7.06	16.21	7.87	15.92	8.72	24.78	6.10	23.78	7.00
2008	12.05	61.57	8.46	14.71	9.27	17.15	10.17	18.08	11.24	28.78	7.60	31.68	7.83
1997–2008	4.80	22.66	3.49	5.93	3.62	7.27	4.03	6.59	4.43	11.28	2.94	11.67	3.29
n	143,166	9,739	133,427	72,831	70,335	33,787	109,379	24,277	118,889	31,808	111,358	25,766	117,400

Notes: Data in this table were taken from the 1997–2008 June HLFS Income Supplements. Minimum wage workers are defined as individuals who receive usual, regular-time hourly earnings within a band between 50 cents below the previous minimum wage (in effect until either February or March of that year) and 50 cents above the current minimum wage (in effect since March or April of that year). To be comparable over time, these band limits are computed in constant June 2008 dollars. All observations on workers' reporting hourly earnings below this minimum wage band are excluded from this table. This decision eliminated less than 1.9% of all possible observations on workers over this sample period. Full-time workers are defined as usually working 30 or more hours per week; part-time workers less than 30 hours per week.

of slightly more than 1.6 percent between 1997 and 2001 to over 8 percent in the last two years of our sample period (2007 and 2008).

Overall, three important conclusions can be derived from the descriptive statistics in the first three columns of Table 2. First, the minimum wages in the late 1990s were binding for only a small percentage of workers. This was particularly true of teenagers, where their minimum wage incidence rates were only slightly higher than that of adult workers during this period. Second, raising the teenage and adult minimum wages resulted in substantial increases in the incidence of the minimum wage among both teenage and adult workers. Finally, both the magnitude and the timing of the increases in minimum wage incidence rates varied substantially between teenagers and adults. Much larger jumps in incidence rates for teenagers occurred between 2000 and 2001, and again between 2006 and 2008. The adult incidence rate increased gradually beginning in 2001, but experienced the biggest rises between 2005 and 2008.

It is useful to compare changes in minimum wage incidence rates in NZ and Australia over the same period. Australia is a neighboring country with a similar history and economy in many respects to that of NZ. With a continuing weakening in the Australian centralized wage-setting system and corresponding increases in the real level of their federal minimum wage since the mid-1990s, increased attention recently has been paid to the effects of the minimum wage in this country (Healy and Richardson, 2006; McGuinness *et al*., 2007; Leigh, 2007; Wooden *et al*., 2007). Leigh, using data from the Survey of Income and Housing, estimated that the minimum wage incidence rate in Australia remained relatively steady at between 20 and 25 percent of all employees between 1994 and 2002. This was despite an average growth rate in the real minimum wage of around 1 percent per annum over this period. Similarly, Healy and Richardson (2006), using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, estimated a minimum wage incidence rate of 22.4 percent for Australia in 2004. Unfortunately, it is difficult to draw direct comparisons of minimum wage incidence rates between NZ and Australia for several reasons. First, the relevant minimum wage for employees under the age of 21 in Australia is difficult to measure with any precision. Youth rates have been set at between 50 and 90 percent of the adult minimum wage, but varied from industry to industry. Second, authors often adopt different bands around the minimum wage to estimate incidence rates. Both Leigh (2007) and Healy and Richardson (2006) used a much wider band of between 50 and 120 percent of the adult federal minimum wage in their analyses.[6] What we can say is that, unlike Australia, minimum wage incidence rates were negligible in NZ until the substantial legislated increases in this country began in 2001. Potentially unlike Australia, these increases in minimum wage incidence primarily involve teenagers in NZ where we have precise measures of their relevant wage floors.

[6]Our preferred band is not set as a percentage of the existing minimum wage, but ranges in real terms from 50 cents below the previous legislated minimum wage to 50 cents above the current minimum wage. Compared to Leigh, and Healy and Richardson, this leads to a much narrower wage band, often ranging between approximately 90 and 105 percent of the minimum wage in New Zealand for adults.

The remaining columns in Table 2 show how minimum wage incidence changed across the sample period in NZ for specific demographic groups.[7] Female workers, those with no formal educational qualifications, and workers from ethnic minority groups were relatively more likely to receive a minimum wage. By the end of our sample period, more than one out of every seven working women was being paid the minimum wage. The same was true for nearly one-in-five of both unqualified and Maori or Pacific Island workers.

The incidence of minimum wage work has historically been relatively higher in part-time employment (defined here as usually working less than 30 hours per week). This same result has been found for Australia (see, e.g., McGuinness *et al*., 2007). Incidence rates rose with the increases in the minimum wage after 1999 in both part-time and full-time work, but at a slightly faster rate in part-time jobs. For example, where minimum wage incidence was three times higher in part-time compared to full-time employment in 1999, it was nearly four times higher in 2008.

Several industries are more likely to create minimum wage jobs.[8] The final two columns of Table 2 show minimum wage incidence in the combined industries of retail, accommodation, and cafes and restaurants relative to all industries. In 1999, workers in this suspected low-wage sector were only slightly more likely to receive the minimum wage (1.79 percent) in these industries compared to all others (0.98 percent). In 2008, minimum wage incidence had increased nearly 18-fold (31.68 percent) in the aggregate retail, accommodation, and cafe and restaurant industry, but less than eight-fold (7.83 percent) in all other industries.

3. The Income Dispersion of Minimum Wage Workers

We now turn to the effectiveness of minimum wages as an antipoverty tool. One of the basic motivations for the provision of wage floors is that they will boost the earnings of low-wage workers and thereby the income of the families or households in which they are located. There are at least three reasons to question the efficacy of the minimum wage as an antipoverty program. First, earnings of affected low-wage workers may not increase if higher minimum wages lead to reductions in hours of work or losses in employment. Second, low-wage workers may not be located in poor families or households (e.g., teenagers living in relatively high-income families). Third, poor families or households may not contain workers who could potentially benefit from a higher minimum wage (e.g., households totally reliant on social welfare benefits).

In the absence of detailed panel data on employment, earnings, and income histories covering a large sample of individuals directly affected by periodic increases in the minimum wage, we need to make inferences about the likely effects

[7]The choice of the relevant demographic characteristics for these descriptive statistics was motivated by earlier work done by Pacheco (2007).

[8]The industries containing a disproportionate number of minimum wages during the early years of these minimum wage increases were first reported by Pacheco (2007). McGuinness *et al*. (2007) found similar industry differences for the location of minimum wage workers in Australia.

of the minimum wage on poverty and income inequality.[9] We begin by looking at possible changes in the location of minimum wage workers across the income distribution over our sample period. We use detailed information in the HLFS Income Supplements to associate all income generated by a household to every individual living within that household at the time of the survey. To better justify income as a measure of living standards, household income is "equivalized" by dividing it by the square root of the number of individuals living within the household at the time of the survey.[10] We then compute the proportion of minimum wage workers in a year who are living within each of these equivalized household income deciles. If they were evenly distributed across the income distribution, then exactly 10 percent of minimum wage workers would be found in each of the income deciles.

As explained earlier, the periods of 1997–99 and 2006–08 are the periods immediately preceding and following recent changes to minimum wages in NZ. These three-year averages also reduce possible measurement error in estimating income dispersion for minimum wage workers due to small sample sizes, especially during the earlier years when there were relatively few minimum wage workers.

A cautionary note should be added to this discussion. A more uniform dispersion of minimum wage workers across the household income distribution at relatively low minimum wages would be expected if there is "noise" in identifying minimum wage workers. Suppose there is some measurement error in both weekly earnings and hours of work in our data. As a result, some workers are incorrectly designated as minimum wage workers. If these "noise minimum wage workers" are relatively constant over time and fairly equally dispersed across the income distribution, they would make up a larger share of estimated minimum wage workers and produce a more even distribution of such workers across the income deciles when minimum wages are relatively low as they in 1997–99. Because we cannot identify potential measurement error in our hourly earnings variable, we have no way of knowing how important this issue might be in accounting for the changing dispersion of minimum wage workers across the income distribution over our sample period.

Figure 3 displays the histograms on the distribution of minimum wage workers across equivalized household income deciles for the 1997–99 and 2006–08 periods. The lighter bars display the income dispersion of minimum wage workers in the earlier period. Somewhat surprisingly, minimum wage workers were not

[9]Even with such individual panel data, estimation of the effects of the minimum wage on individual earnings and eventual family or household income would be difficult. We would have to estimate the possible effects of the minimum wage on reducing employment and hours of work by eliminating other potential influences on these labor market outcomes. We would also have to estimate the impacts on the earnings and non-labor incomes of other family or household members who might be indirectly affected by such changes in the work and earnings of affected low-wage workers. See Pacheco (2011) for estimates of the impact of minimum wages on employment and labor demand outcomes in New Zealand using similar HLFS data.

[10]The family of equivalence scales where household income is divided by the number of individuals in the household raised to the power α is described in Buhmann *et al.* (1988). The parameter α is scale elasticity in sharing income. If α is one, we have per capita income in the household and no economies of scale. If α is zero, we have household income and maximum economies of scale. The value of α of 0.5 is midway between these two extremes and has been used in a large number of recent studies (see, e.g., Atkinson *et al*., 1995; Pascual *et al*., 2005).

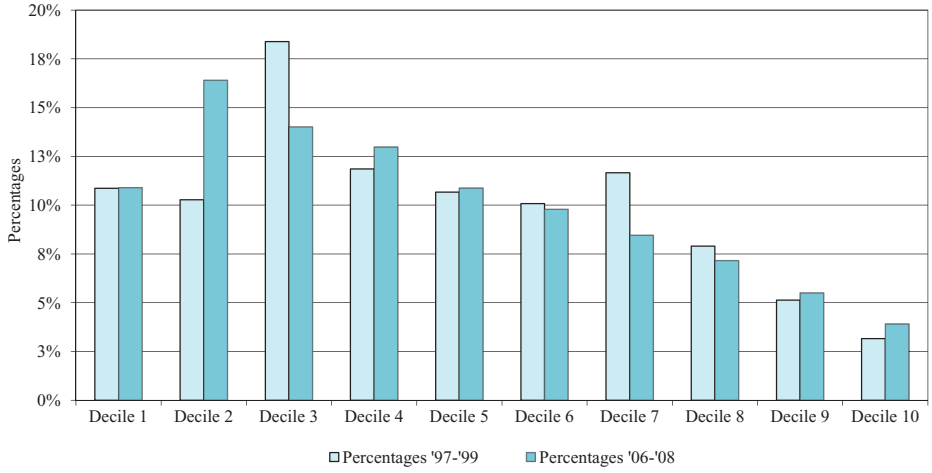

Figure 3. Dispersion of Minimum Wage Workers across Equivalized Household Income Deciles, 1997–99 and 2006–08

Notes: Data in this figure were taken from the 1997–2008 June HLFS Income Supplements. Household income was equivalized by dividing the annual dollar amount by the square root of the number of individuals living within the household. The distribution of all minimum wage workers across these equivalized household income deciles is recorded and averaged over the three-year periods (1997–99 and 2006–08). See the notes at the bottom of Table 2 for the definition of minimum wage workers used in this study.

heavily concentrated in the bottom two deciles. For example, only slightly more than 10 percent of minimum wage workers were located in deciles one and two during the 1997–99 period. Only decile three contained more than 12 percent of minimum wage workers during this earlier period (18.4 percent). Overall, it would be fair to conclude that minimum wage workers were relatively more likely to be located in lower income deciles. For example, 39.5 percent of minimum wage workers were located in the bottom three deciles in 1997–99, compared to just 16.2 percent in the top three deciles. Another way to state this result is that minimum wage workers were 2.44 times more likely during this three-year period to live in households with the lowest 30 percent of equivalized income compared to households with the highest 30 percent of equivalized income.

The darker bars in Figure 3 display the income dispersion of minimum wage workers in the latter period following substantial increases in teenage and adult wage floors. The overall dispersion of minimum wage workers in the latter period looks fairly similar to the pattern in the earlier period. There was a slight increase in the proportion of minimum wage workers in the bottom three income deciles (from 39.5 to 41.3 percent), and a much smaller increase in the proportion of minimum wage workers in the top three income deciles (from 16.2 to 16.6 percent). The net result was a slight increase in the odds of minimum wage workers living in the bottom three relative to the top three income deciles from (from 2.44 to 2.49). Thus, the substantial increases in both teenage and adult minimum wages during our sample period did not appear to have a substantial impact on the income dispersion of minimum wage workers.

Our findings suggest that minimum wage workers in NZ are more equally distributed across the income distribution compared to some European countries. Dolado *et al.* (1996) found that between 50 and 60 percent of minimum wage workers in France, the Netherlands, Spain, and the United Kingdom were located in the bottom three household income deciles. Our figure of around 40 percent of minimum wage workers in the bottom three income deciles is closer to similar figures of 42.8 percent for the U.S. reported by Card and Krueger (1995) and 43.1 percent for Canada reported by Fortin and Lemieux (2000).[11] Our findings are also broadly consistent with the results from Australia which show that minimum wage workers are not heavily concentrated among the poorest households (e.g., Healy and Richardson, 2006; Leigh, 2007; McGuinness *et al.*, 2007; Wooden *et al.*, 2007). For example, Wooden *et al.* found that only 27.8 percent of the lowest-paid 10 percent of adult employees aged 21 and over were located in the bottom three deciles of equivalized household income.

It may be that higher relative minimum wages lead to a more equal dispersion of minimum wage workers across the income distribution. Yet, statistics obtained from the OECD minimum wage database do not support this hypothesis.[12] Of the four countries with a high concentration of minimum wage workers among poor households, two had minimum wage to median wage ratios of 0.51 or higher (France and the Netherlands) and two had similar ratios of 0.43 or lower (Spain and the U.K.) in 2000. Of the four countries with a low concentration of minimum wage workers among poor households, two had minimum wage to median wage ratios of 0.50 or higher (NZ and Australia) and two had similar ratios of 0.41 or lower (Canada and the U.S.). This cross-country evidence suggests that there is no simple relationship between the relative magnitude of the minimum wage and the concentration of minimum wage workers in the poorest households.

It is possible, of course, that many other factors were influencing the location of minimum wage workers across the income distribution over our sample period. In particular, there were changes in household composition and a booming economy in NZ. We want to isolate the effects of changes in legislated wage floors on the distribution of minimum wage workers across the income deciles while holding these other variables constant. Consequently, we consider a multinomial logit regression model, where the probability that a minimum wage worker is located in one of the ten equivalized household income deciles is a function of the age, gender, ethnicity, educational qualifications, household composition, local area unemployment rate, and the relevant real minimum wage for that individual. Two dummy variables capture household composition. The first indicates the presence of a dependant child in the household, the second indicates no other adult in the household. To capture the state of the overall economy, we rely on variation in regional unemployment rates. We want to take advantage in this regression model of the time variation in legislated changes to minimum

[11]It should be noted that Card and Krueger used income measures for the family, where we use income defined for the household.

[12]Annual OECD data on minimum wages relative to median wages across countries can be found at http://stats.oecd.org/Index.aspx?DataSetCode=RHMW.

wages for the three distinct age groups. For this reason, we interact the age-relevant minimum wage with the age-specific dummy variables. In this way, we can estimate the separate effects of changes in teenage and adult minimum wages on the probability that a given minimum wage worker will be located in a particular income decile.

The results from the estimation of this regression model are reported in Table 3. The estimated partial derivatives on the probabilities of a minimum wage worker being located in an equivalized household income decile are reported, along with their estimated standard errors. All marginal effects are computed at the means of the covariates in this sample, and the coefficients are normalized to zero for the fifth income decile.

Having a dependant child in the household and having no other adult in the household both significantly increase the probabilities that minimum wage workers will be located in lower income deciles. The same variables significantly reduce the likelihood that a minimum wage worker will be in a high-income household. These findings are as expected, as having a dependant child in the household directly deflates equivalized income by adding another household member and may indirectly reduce income by lowering hours of work and earnings to care for a dependant child. As a result, a minimum wage worker living in a household with a dependant child is relatively more likely to come from a lower income decile. Having no other adult in the household directly inflates equivalized income by reducing the number of household members. However, this effect is more than offset by the increase in earnings that would often accompany another adult living in that household. As a result, having a dependant child and having no other adult in the household both increase the probability that a minimum wage worker will be located in a lower income decile.

Regional unemployment rates have minimal impacts on the income dispersion of minimum wage workers. A positive and significant effect is estimated on the probability of being in decile two, and negative and significant effects are estimated on being located in the eighth and tenth deciles. These results suggest that an increase in the unemployment rate would slightly increase the "target efficiency" of the minimum wage. Minimum wage workers are slightly more likely to come from lower income deciles during cyclical downturns.

Finally, real minimum wages are found to have relatively weak statistical relationships with the income dispersion of minimum wage workers across the three age groups. Specifically, increases in the real minimum wage for younger and older teens had positive and statistically significant effects on the probabilities of a minimum wage worker being located in income deciles nine and two, respectively. All other estimated partial derivatives on teenage minimum wages are insignificant in this regression.

The adult minimum wage had slightly stronger statistical effects on the probability of a minimum wage worker being located in a particular income decile. The estimated partial derivatives were positive and significant for decile two, and negative and significant in deciles five and ten. This suggests that a rise in the adult minimum wage made it more likely that minimum wage workers would be located in decile two, relative to the middle and top deciles.

TABLE 3

MULTINOMIAL LOGIT REGRESSION RESULTS ON THE LOCATION OF MINIMUM WAGE WORKERS IN EQUIVALIZED HOUSEHOLD INCOME DECILES, JUNE 1997 TO JUNE 2008

	Estimated Partial Derivatives on Probability of Being in Decile:									
Regressors	1	2	3	4	5	6	7	8	9	10
Constant	0.005	–0.944***	0.289	–0.065	0.340*	0.061	0.017	0.036	0.102	0.167**
	(0.148)	(0.166)	(0.188)	(0.189)	(0.179)	(0.154)	(0.133)	(0.111)	(0.092)	(0.072)
Age 16 or 17	0.037	0.562***	–0.180	0.129	–0.301*	0.051	–0.010	–0.014	–0.148*	–0.126*
	(0.161)	(0.180)	(0.203)	(0.194)	(0.178)	(0.150)	(0.128)	(0.107)	(0.088)	(0.069)
Age 18 or 19	0.189	0.022	–0.117	0.002	–0.051	0.106	–0.036	0.010	–0.008	–0.117
	(0.228)	(0.349)	(0.288)	(0.285)	(0.243)	(0.202)	(0.175)	(0.139)	(0.108)	(0.081)
Age 20–29	0.017	–0.006	–0.009	–0.002	–0.007	–0.023**	0.025**	0.008	0.004	–0.006
	(0.010)	(0.012)	(0.013)	(0.013)	(0.013)	(0.012)	(0.010)	(0.008)	(0.007)	(0.006)
Age 50+	0.025**	0.034***	–0.005	–0.040**	–0.012	–0.006	0.023**	–0.002	–0.012	–0.005
	(0.012)	(0.013)	(0.016)	(0.016)	(0.015)	(0.013)	(0.011)	(0.010)	(0.008)	(0.006)
Female	–0.031***	–0.034***	–0.010	–0.005	0.032***	0.021***	0.020***	0.010*	–0.002	–0.001
	(0.008)	(0.009)	(0.010)	(0.010)	(0.010)	(0.008)	(0.007)	(0.005)	(0.004)	(0.003)
Maori or Pacific Islander	–0.006	–0.026**	0.039***	0.008	0.008	0.005	0.005	0.003	–0.017***	–0.019***
	(0.009)	(0.010)	(0.011)	(0.012)	(0.011)	(0.010)	(0.008)	(0.007)	(0.006)	(0.005)
New Zealand born	–0.036***	0.007	0.002	–0.002	–0.011	0.009	0.008	0.016**	0.001	0.006
	(0.009)	(0.010)	(0.012)	(0.011)	(0.011)	(0.009)	(0.008)	(0.006)	(0.005)	(0.004)
School or post-school qualification	0.019**	–0.013	–0.033***	0.004	0.003	–0.002	0.005	0.002	0.009*	0.006
	(0.009)	(0.009)	(0.011)	(0.011)	(0.010)	(0.009)	(0.007)	(0.006)	(0.005)	(0.004)
University degree	0.041**	0.004	–0.030	–0.025	–0.018	–0.029	0.003	0.021*	0.016	0.019**
	(0.017)	(0.020)	(0.025)	(0.025)	(0.023)	(0.021)	(0.017)	(0.012)	(0.010)	(0.008)
Dependent child in household	0.035***	0.040***	0.035***	0.013**	–0.014***	–0.028***	–0.020***	–0.028***	–0.021***	–0.014***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)
No other adult in household	0.206***	0.257***	0.199***	–0.008	–0.042**	–0.149***	–0.164***	–0.134***	–0.096***	–0.069***
	(0.011)	(0.012)	(0.014)	(0.017)	(0.016)	(0.018)	(0.019)	(0.016)	(0.013)	(0.011)
Local unemployment rate	0.003	0.007*	–0.002	0.000	–0.003	0.003	0.003	–0.004*	–0.003	–0.004**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Age 16 or 17 × log of real minimum wage	–0.085	0.097	–0.079	–0.022	0.021	–0.014	0.017	0.025	0.044*	–0.003
	(0.054)	(0.060)	(0.068)	(0.061)	(0.053)	(0.044)	(0.036)	(0.028)	(0.023)	(0.017)
Age 18 or 19 × log of real minimum wage	–0.111	0.349**	–0.066	0.040	–0.104	–0.063	0.009	–0.009	–0.032	–0.013
	(0.087)	(0.140)	(0.110)	(0.109)	(0.089)	(0.073)	(0.064)	(0.049)	(0.037)	(0.026)
Age 20+ × log of real minimum wage	–0.014	0.382***	–0.099	0.050	–0.129*	–0.022	–0.026	–0.021	–0.046	–0.074**
	(0.057)	(0.064)	(0.073)	(0.074)	(0.070)	(0.060)	(0.052)	(0.044)	(0.036)	(0.029)
N	6,868									
Log likelihood function	–14,224.9									
Pseudo R^2	0.0772									

Notes: Data in this table were taken from the 1997–2008 June HLFS Income Supplements. See the notes at the bottom of Table 2 for the definition of minimum wage workers used in this study. The dependent variable equals one if a minimum wage worker is observed in a given equivalized household income decile; zero otherwise.

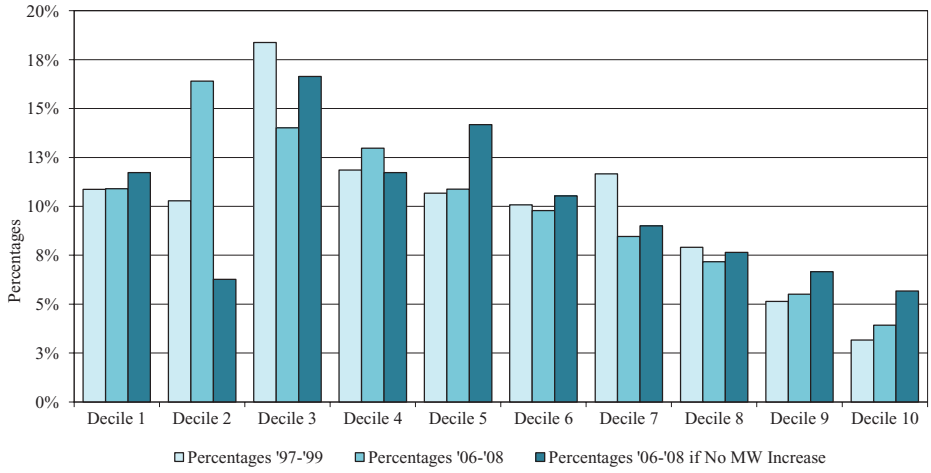

Figure 4. Dispersion of Minimum Wage Workers across Equivalized Household Income Deciles, 1997–99 and 2006–08

Notes: Data in this figure were taken from the 1997–2008 June HLFS Income Supplements. See the notes at the bottom of Table 2 for the definition of minimum wage workers, and the notes at the bottom of Figure 3 for the definition of equivalized household income used in this study. The percentages of minimum wage workers in each income decile in the latter period were estimated based on our multinomial regression results reported in Table 3, assuming that there had been no increases in real minimum wages over our sample period. These percentages were predicted by multiplying the estimated partial derivatives on the log of the minimum wages in each income decile by the average changes between periods in the log minimum wages for the three age groups in this income decile. The resulting figures were then subtracted from the observed average percentage of minimum wage workers in this decile between 2006 and 2008.

Another way of stating the results in Table 3 is that the observed increase in the proportion of minimum wage workers located in decile two between 1997–99 and 2006–08 (shown in Figure 3) can be statistically linked to the rise in real minimum wages for those 18 years and over. The rise in the real minimum wage for 16- and 17-year-olds had no measureable effect on the higher proportion of minimum wage workers in this decile. However, the higher minimum wage among younger teenagers did slightly increase the probability that a minimum wage worker would be located in decile eight. The increase in the real adult minimum wage also significantly reduced the probabilities of minimum wage workers being observed in the fifth and tenth income deciles.

We can summarize these regression results in Table 3 by returning to the earlier histograms on the dispersion of minimum wage workers across the income deciles. Figure 4 shows what we estimate would have happened to the income dispersion of minimum wage workers in 2006–08 if minimum wages had been adjusted only for inflation after 1999. To produce the darkest set of bars in this figure, we subtracted from the actual proportion of minimum wage workers in a decile in the latter period the estimated impact associated with actual increases in real minimum wages for all three age groups over the sample period. The darkest bars in Figure 4 are the estimated percentages of minimum wage workers that would have been located in each of the equivalized household income deciles in

2006–08 if minimum wages had remained at their real 1997–99 levels, while everything else had been allowed to change as it did.[13]

Not surprisingly, given the results reported in Table 3, the biggest adjustment to the income dispersion of minimum wage workers occurred in the second income decile. Most of the substantial increase in the proportion of minimum wage workers observed in this decile between periods (10.3 to 16.4 percent) can be attributed directly to the legislated increases in real minimum wages. If real minimum wages had *not* increased over this period, we estimate that the percentage of minimum wage workers in the second decile would have actually declined from 10.3 to 6.3 percent. We suggest two reasons for this finding. First, our data indicate that households in this second decile had nearly twice as many workers as households in the first decile. Second, a relatively large proportion of these workers face low wages in the labor market. As real minimum wages increased over our sample period, many of the low-wage workers became categorized as minimum wage workers. All of the observed increase in location of minimum wage workers in this second income decile can be attributed to the legislated increases in real minimum wages between 1997–99 and 2006–08.

Overall, our analysis suggests that if minimum wages had remained at their real 1997–99 levels, the proportion of minimum wage workers in the bottom three deciles would have fallen from 41.3 to 34.6 percent, but would have risen in the top three deciles from 16.6 to 20.0 percent. Thus, without these increases in real minimum wages, the distribution of minimum wage workers would have become slightly more uniform across the income distribution. Legislated increases in real minimum wages are estimated to have resulted in a closer association between minimum wage work and low household income. This can also be summarized by the use of odds ratios. In 1997–99, minimum wage workers were 2.44 times more likely to live in the bottom three income deciles relative to the top three income deciles. We estimate that if real minimum wages had *not* increased, this odds ratio would have fallen to 1.73 by 2006–08.

4. The Incidence of Minimum Wage Work by Household Income

The analysis in the previous section focused on changes in the income dispersion of all minimum wage workers over the last 12 years. In this section, we look at the incidence of minimum wage work among all workers within each of the equivalized household income deciles. Table 3 has already displayed some descriptive statistics on minimum wage incidence rates. We know that these rates increased substantially over time along with the legislated increases in real minimum wages, and we have seen how this minimum wage incidence among workers varies by demographic characteristics. Continuing with our interest in the possible antipoverty effects of the minimum wage, we now consider how minimum wage incidence varies across the income distribution, and how changes in these

[13]In each decile, we subtract from the observed proportion of minimum wage workers in the 2006–08 period the products of the estimated partial derivatives on the age-specific minimum wage variables multiplied by the observed changes in these variables between the periods 1997–99 and 2006–08 for all three age groups.

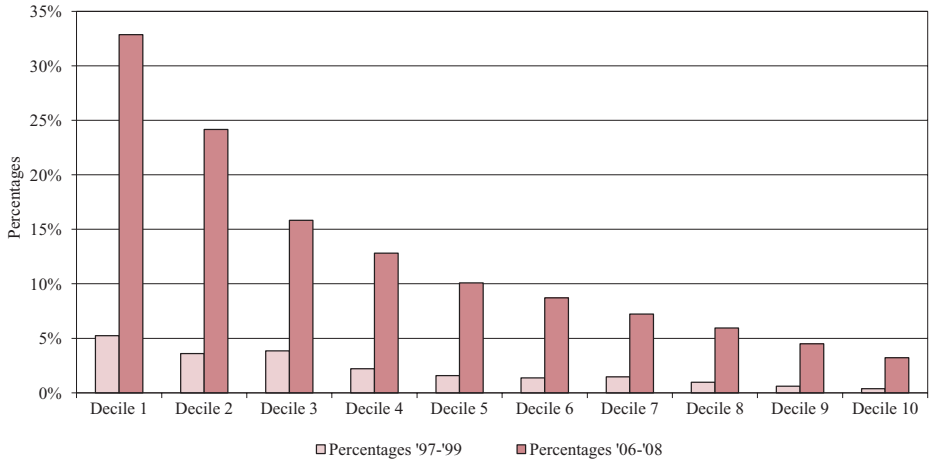

Figure 5. Incidence of Minimum Wage Worker in Equivalized Household Income Deciles, 1997–99 and 2006–08

Notes: Data in this figure were taken from the 1997–2008 June HLFS Income Supplements. See the notes at the bottom of Table 2 for the definition of minimum wage workers, and the notes at the bottom of Figure 3 for the definition of equivalized household income used in this study. The percentages of all workers receiving hourly earnings in our minimum wage band are recorded across these equivalized household income deciles and averaged over the three-year periods (1997–99 and 2006–08).

incidence rates may have been affected differently by policies to substantially lift the minimum wage levels.

Figure 5 displays histograms on the percentages of minimum wage workers in each income decile averaged over the 1997–99 and 2006–08 periods. As expected, minimum wage incidence is negatively related to equivalized household income in both periods, and has increased substantially in each income decile along with increases in real minimum wages over our sample period. For example, 5.24 percent of workers in the bottom income decile were classified as minimum wage workers in 1997–99. This figure increased more than six-fold to 32.86 percent by 2006–08. In the fifth and top income deciles, the incidence of minimum wage work also increased more than six-fold (from 1.58 to 10.08 percent) and eight-fold (from 0.37 to 3.22 percent), respectively. Thus, although the *absolute* percentage changes in minimum wage incidence rates were larger in the lower income deciles between 1997–99 and 2006–08, the *relative* changes in incidence rates were often larger in the higher income deciles over the same period.

The large increases in minimum wage incidence between 1997–99 and 2006–08 could result from legislated increases in these wage floors, changes in the demographic compositions of households, and the cyclical upturn in the economy over this sample period. To help isolate the effects of minimum wage policy, maximum likelihood probit models were estimated for each of the income deciles. The dependent variable is dichotomous and equals one if a worker receives the minimum wage, and zero if the worker earns more than the minimum wage. Unlike the multinomial logit results reported in Table 3, these are separate probit

results using data on all workers in each income decile from all of the years in our sample. In this way, the coefficients are allowed to fully interact with the ten income groups. The same covariates as before are included in this analysis, and the full set of regression results are reported in Table 4.

The effects of gender on minimum wage incidence tell an interesting story across the income distribution. Female workers are significantly more likely to receive a minimum wage in all but the bottom income decile. For example, minimum wage incidence is 2.6 percentage points higher for female relative to male workers in the second income decile. This gender effect increases in magnitude, before declining steadily over income deciles four through ten. The absence of a statistically significant gender effect in the bottom income decile may be related to work disincentives of social welfare programs and the fact that women are much more likely to receive the Domestic Purposes Benefit which, unlike the Unemployment Benefit, does not generally have an active job search requirement.

As expected, educational qualifications generally have negative and significant effects on minimum wage incidence. Yet, it is worth noting that these partial derivatives generally decline in magnitude at higher income deciles. The implication is that acquiring educational qualifications will have a relatively larger impact in reducing minimum wage incidence among workers living in lower-income households.

Regional unemployment rates do not have consistently significant effects on minimum wage incidence across the income distribution. The partial derivatives were positive and significant in only income deciles one and seven. This suggests that the overall decline in the aggregate unemployment rate with a rapidly expanding NZ economy over the sample period had little impact on minimum wage incidence.

The results from Table 4 also show consistently positive and significant effects on minimum wage incidence for increases in real teenage and adult minimum wages across the entire income distribution. The estimated partial derivatives are significantly different from zero at better than a 1 percent level in all regressions for age-specific minimum wages. The estimated effects decline steadily in magnitude when moving from lower to higher income deciles. For example, we estimate that a 10 percent increase in the adult real minimum wage raises the proportion of adult minimum wage workers by 9.34 percentage points in the lowest income decile. This same 10 percent increase in the adult minimum wage raises minimum wage incidence rates by 1.55 and 0.25 percentage points in the fifth and top income deciles, respectively. Thus, the effects of increases in real adult minimum wages on incidence rates are more than 37 times larger in the bottom relative to the top household income decile.

Teenage minimum wages have similar positive and significant effects on their minimum wage incidence across the income distribution. For example, a 10 percent increase in the minimum wages for 16- or 17-year-olds would increase their minimum wage incidence by 6.21 percentage points in income decile one, but only by 0.36 percentage points in decile ten. Similar declines in these estimated effects are found across the income deciles for 18- or 19-year-olds.

It is also worth noting that adult minimum wages appear to have larger effects on incidence rates relative to teenage minimum wages at lower income deciles,

TABLE 4

PROBIT REGRESSION RESULTS ON THE PROBABILITY OF BEING A MINIMUM WAGE WORKER FOR ALL WORKERS BY EQUIVALIZED HOUSEHOLD INCOME DECILE, JUNE 1997 TO JUNE 2008

	Estimated Partial Derivatives on Minimum Wage Incidence Conditional on Being a Worker in Decile:									
Regressors	1	2	3	4	5	6	7	8	9	10
Constant	−2.406***	−1.794***	−0.928***	−0.780***	−0.460***	−0.426***	−0.335***	−0.249***	−0.168***	−0.089***
	(0.163)	(0.118)	(0.078)	(0.057)	(0.043)	(0.039)	(0.032)	(0.028)	(0.023)	(0.018)
Age 16 or 17	0.937***	0.865***	0.598**	0.870***	0.314	0.693**	0.586*	0.322	0.030	0.015
	(0.009)	(0.129)	(0.293)	(0.143)	(0.306)	(0.273)	(0.322)	(0.336)	(0.085)	(0.058)
Age 18 or 19	0.925***	0.906***	0.638*	0.116	0.273	0.482	0.414	0.406	0.192	0.029
	(0.016)	(0.072)	(0.327)	(0.298)	(0.347)	(0.363)	(0.385)	(0.407)	(0.325)	(0.091)
Age 20–29	0.061***	0.056***	0.051***	0.044***	0.029***	0.022***	0.031***	0.019***	0.015***	0.009***
	(0.014)	(0.011)	(0.008)	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)
Age 50+	−0.013	0.004	−0.009	−0.010**	0.001	0.001	0.009***	0.003	−0.000	0.001
	(0.013)	(0.010)	(0.006)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)
Female	−0.007	0.026***	0.041***	0.030***	0.026***	0.021***	0.015***	0.010***	0.006***	0.003***
	(0.010)	(0.007)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Maori or Pacific Islander	0.036***	0.005	0.027***	0.009**	0.002	0.002	0.003	0.003	−0.001	−0.000
	(0.012)	(0.008)	(0.006)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)
New Zealand born	−0.017	−0.004	−0.008	−0.008**	−0.009***	−0.004	−0.004*	0.000	−0.002	−0.000
	(0.010)	(0.008)	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
School or post-school qualification	−0.021**	−0.043***	−0.037***	−0.020***	−0.010***	−0.016***	−0.010***	−0.010***	−0.007***	−0.007***
	(0.010)	(0.008)	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)
University degree	−0.054***	−0.054***	−0.042***	−0.031***	−0.020***	−0.020***	−0.014***	−0.010***	−0.010***	−0.010***
	(0.013)	(0.008)	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Dependent child in household	−0.012***	−0.015***	−0.010***	−0.008***	−0.006***	−0.006***	−0.001	−0.001	0.001	0.001**
	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
No other adult in household	−0.002	0.025***	−0.013***	−0.034***	−0.025***	−0.023***	−0.018***	−0.011***	−0.008***	−0.004***
	(0.010)	(0.008)	(0.005)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Local unemployment rate	0.009**	0.003	−0.001	0.001	−0.000	0.001	0.001*	−0.000	−0.000	−0.000
	(0.004)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age 16 or 17 × log of real minimum wage	0.621***	0.609***	0.315***	0.234***	0.170***	0.135***	0.106***	0.087***	0.067***	0.036***
	(0.078)	(0.068)	(0.039)	(0.028)	(0.020)	(0.017)	(0.013)	(0.012)	(0.010)	(0.007)
Age 18 or 19 × log of real minimum wage	0.644***	0.513***	0.279***	0.297***	0.150***	0.129***	0.100***	0.073***	0.052***	0.032***
	(0.090)	(0.084)	(0.043)	(0.043)	(0.022)	(0.017)	(0.015)	(0.012)	(0.010)	(0.007)
Age 20+ × log of real minimum wage	0.934***	0.676***	0.327***	0.276***	0.155***	0.143***	0.108***	0.079***	0.052***	0.025***
	(0.065)	(0.048)	(0.030)	(0.022)	(0.016)	(0.015)	(0.012)	(0.010)	(0.008)	(0.007)
N	5,583	7,518	11,989	13,852	15,487	16,574	17,373	17,990	18,391	18,409
Log likelihood function	−1,986.1	−2,353.2	−2,969.5	−2,679.2	−2,282.3	−2,274.5	−2,625.6	−2,295.1	−1,350.6	−1,034.1
Pseudo R^2	0.140	0.165	0.147	0.190	0.220	0.224	0.239	0.266	0.275	0.316

Notes: Data in this table were taken from the 1997–2008 June HLFS Income Supplements. See the notes at the bottom of Table 2 for the definition of minimum wage workers used in this study. In each of the equivalized household income deciles, the dependent variable equals one if an individual is a minimum wage worker; zero otherwise.

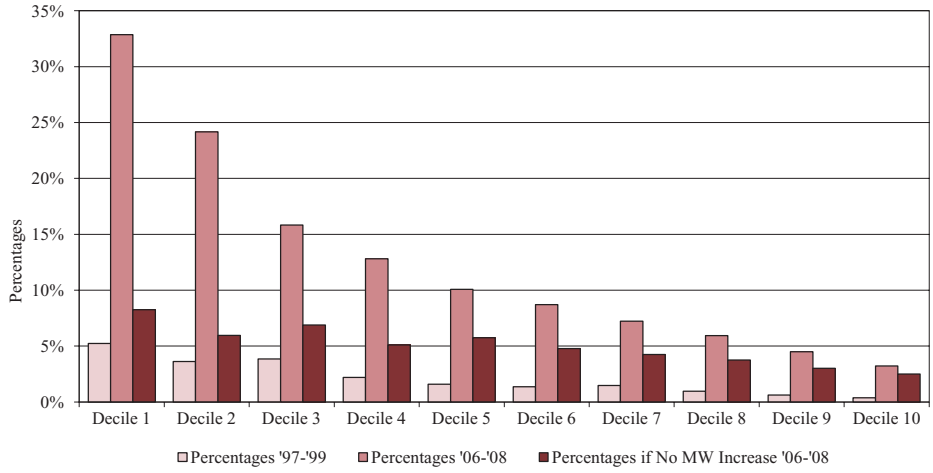

Figure 6. Incidence of Minimum Wage Workers in Equivalized Household Income Deciles, 1997–99 and 2006–08

Notes: Data in this figure were taken from the 1997–2008 June HLFS Income Supplements. See the notes at the bottom of Table 2 for the definition of minimum wage workers, and the notes at the bottom of Figure 3 for the definition of equivalized household income used in this study. The estimated percentages of workers who would have received a constant real minimum wage in the latter period were based on our probit regression results reported in Table 4. These percentages were predicted by multiplying the estimated partial derivatives on the log of the minimum wages in each income decile by the average changes between periods in the log minimum wages for the three age groups in this income decile. The resulting figures were then subtracted from the observed average percentages between 2006 and 2008.

specifically in income deciles one through three. The opposite is true in the upper income deciles. Although some of these differences are not statistically significant, this suggests that adult minimum wages may be more important in explaining incidence rates among lower income households, while teenage rates may be more important for this purpose at higher income levels.

Figure 6 shows what might have happened to minimum wage incidence across the income distribution in 2006–08 if minimum wages had been adjusted only for inflation after 1999. To produce the darkest set of bars in this figure, we subtracted from the actual 2006–08 incidence rates in a given decile the estimated impact associated with the real increases in the minimum wage over the sample period. This estimated effect is the product in each income decile of the observed growth rates in average real minimum wages between 1997–99 and 2006–08, and the estimated partial derivatives on these variables from the regression results in a given income decile. Therefore, the darkest bars in Figure 6 are the estimated percentages of minimum wage workers in a decile if statutory minimum wages had been kept at their real 1997–99 levels and everything else had been allowed to change as it did.

Removing the effects of increases in real minimum wages between 1997–99 and 2006–08 on incidence rates has substantial effects on these estimated figures across the income deciles. For example, we showed that minimum wage incidence increased in decile one from 5.24 to 32.86 percent between these periods. Without

the substantial increases in real teenage and adult minimum wages over the period, we estimate that the minimum wage incidence in this decile would have increased to only 8.25 percent by 2006–08. Thus, the legislated increases in minimum wages account for nearly 90 percent of the observed increase in the incidence of minimum wage work among workers in the bottom-income decile. The relative importance of these legislated changes to minimum wages in explaining the rises in incidence rates declines as we move to higher income deciles. At income decile five, real increases in teenage and adult minimum wages explain slightly over 50 percent of the observed increase in minimum wage incidence. By income decile ten, the comparable figure falls to slightly less than 25 percent.

Across income deciles, minimum wage incidence among workers increased from 1.68 percent in 1997–99 to 9.83 percent in 2006–08. We estimate that without the actual increases in real teenage and adult minimum wages over this period, this increase would have been much more modest to 4.74 percent. Thus, increases in real minimum wages account for more than 62 percent of this increase in minimum wage incidence between these periods. This raises the issue of why minimum wage incidence would have increased in the absence of real increases in wage floors. There are a number of potential explanations. First, this might have resulted from demographic changes in the composition of the workforce. Second, it may have been associated with the rapid growth in the economy over this period that drew more low-wage workers into employment. Third, it could have resulted from a general increase in wage dispersion in the labor market that made lower wage workers more vulnerable to minimum wage work.

5. The Minimum Wage and Poverty Simulations

Previous sections in this report show how large recent rises in minimum wages in NZ may have altered the characteristics of minimum wage workers, including their location in the overall distribution of household income. No estimates have been produced thus far for the possible antipoverty impacts of the minimum wage. In this section, we report the results from a series of simulations where the observed earnings of minimum wage workers are increased as the result of a hypothetical 10 percent increase in the minimum wage. We then ask under a couple of scenarios how this policy would likely alter the rate of poverty in this country. As Leigh (2007) points out, the impact of a rise in the minimum wage on poverty depends on three things: (i) the location of minimum wage workers across the income distribution; (ii) the elasticity of actual wages received with respect to the minimum wage; and (iii) the elasticity of employment or hours of work with respect to the minimum wage.

A substantial international literature exists on the possible antipoverty effects of minimum wages. For example, Metcalf (1999) found that the newly introduced minimum wage in the U.K. primarily benefits middle-income households. Among working households, however, the benefits of a minimum wage are concentrated among the poorest households. Neumark *et al.* (2005), using variations in federal and state minimum wages in the United States, concluded that although minimum wages benefit some poor families, the overall net effect is to increase poverty (or near poverty) rates. Burkhauser and Sabia (2007) found that minimum wage

increases in the U.S. between 1988 and 2003 did not lower overall poverty, or poverty among working families or single mothers. Sabia and Burkhauser (2010) updated the previous study and showed that a recently proposed increase in the U.S. federal minimum wage would be even more poorly targeted to the working poor than previous increases. They suggest that the Earned Income Tax Credit would be a much more effective policy for reducing poverty. Similar results have been recently found in Canada, where Sen *et al*. (2011) used variation in minimum wages across provinces and time and found that a 10 percent increase in the minimum wage is associated with a 3–5 percent decline in teenage employment and a 4–6 percent rise in family poverty.

A number of studies have attempted to estimate the impact of minimum wages on income inequality and poverty rates in Australia. McGuinness *et al*. (2007), Healy and Richardson (2006), and Wooden *et al*. (2007) all found that minimum wage (or low-wage) employees were *not* heavily concentrated among the poorest households. They tend to be either fairly evenly spread across the household income distribution, or slightly more concentrated in the middle income deciles. However, when the population was restricted to households with employees or those with part-time workers, minimum wage workers were more heavily concentrated among the poorest households.

Leigh (2007) reported the results from simulations on the effects on household income inequality of a 10 percent increase in the federal minimum wage in Australia. He performed these simulations under various scenarios involving two elasticities. The first concerns the elasticity of actual wages received relative to the minimum wage. The second involves the employment elasticity with respect to the minimum wage. Leigh considered three measures of inequality using equivalized household income: the Gini coefficient, Atkinson index, and share of individuals living in households below 50 percent of median income. If actual wages for minimum wage workers rise fully with an increase in the minimum wage and there are no disemployment effects (the most optimistic scenario), Leigh concluded that a 10 percent increase in the Australian federal minimum wage would result in less than a 1 percent decline in household income inequality as measured by either the Gini coefficient or Atkinson index. In all other scenarios, household income inequality would increase as a result of a higher minimum wage. Most relevant for our analysis, Leigh found that the share of individuals living below 50 percent of equivalized household income increased under any scenario involving a 10 percent increase in the minimum wage. Thus, Leigh's simulations suggest that relative poverty might increase in Australia with a rise in the minimum wage. Our analysis essentially links two areas of minimum wage study in Australia. Like Leigh, we simulate the effects on relative poverty of an increase in the minimum wage in NZ. Like McGuinness *et al*. and Healy and Richardson, we do this for both the general household population and specific subpopulations that might be of interest to policymakers (households with at least one employee and households with at least one minimum wage worker).

For our analysis, we also use a relative measure of poverty set at 50 percent of median equivalized household income in a given year. The entire sample of HLFS-IS households over the 1997–2008 period will be used at the outset for this exercise. The only restrictions are that cases of suspected measurement error in

TABLE 5

Antipoverty Simulations for the Earnings Increases Associated with a 10% Rise in the Minimum Wage

	All Households	Households with a Worker	Households with a Minimum Wage Worker
Initial poverty rate	22.02%	10.50%	26.69%
Estimated poverty rate if:			
10% added to usual earnings from minimum wage jobs	21.94%	10.38%	24.20%
10% added to usual earnings from minimum wage jobs, offset by 3% reduction in usual weekly hours of work	21.97%	10.43%	25.17%
N	200,361	143,166	6,868

Notes: Data used in this table were taken from the 1997–2008 June HLFS Income Supplements. Poverty is defined as having equivalized household income below 50% of median equivalized household income in a year.

terms of hours of work and earnings were removed (as was done in the earlier analysis in this study). Throughout these simulations we use the 50-cent band around the most recent minimum wage rates to identify minimum wage workers. As before, all workers who report receiving hourly earnings below this 50-cent band are excluded from this analysis.

Table 5 displays the results from our policy simulations. We begin with 200,361 household observations over our 12-year period. The initial poverty rate is 22.02 percent. More than one-in-five households are receiving less than 50 percent of equivalized household income. The poverty rate is lower for households with at least one employed member (10.50 percent), but higher for households with at least one minimum wage worker (26.69 percent).

The first policy simulation assumes that minimum wages increase by 10 percent, and that all defined minimum wage workers in our sample experience a corresponding 10 percent increase in earnings. This corresponds to the best-case scenario where the higher minimum wage results in no reduction in earnings from an associated loss in employment or hours of work. Recomputing the poverty rate after this policy change, we estimate that it would decline from 22.02 to 21.94 percent. Even with no indirect loss in employment or hours of work from this higher minimum wage, the impact on the poverty rate among all households is very small. The poverty rate declines by 0.08 percentage points, or 0.36 percent from its initial level. This is undoubtedly related to the finding in the previous section that minimum wage workers are fairly widely dispersed across the income deciles. Lifting the earnings of minimum wage workers can reduce the overall poverty rate, but the effect is relatively small because minimum wage workers are not heavily concentrated in the bottom of the income distribution.[14]

[14]As would be expected, these poverty-reducing effects of a 10 percent increase in minimum wages would be slightly smaller if minimum wage workers were defined using a narrower 20-cent band (0.06 percentage-point reduction in the poverty rate or 0.27 percent of its initial level) and slightly larger if minimum wage workers were defined using a broader 100-cent band (0.14 percentage-point reduction or 0.64 percent of its initial level).

This same increase in earnings from a 10 percent rise in minimum wages could have much larger antipoverty effects among certain subsets of households. For example, under our approach only households with a worker would benefit from a higher minimum wage. Additionally, these positive effects could only occur among households with a current minimum wage worker. The last two columns in Table 5 show the effects on poverty rates for these subpopulations from a 10 percent increase in minimum wages with no loss in employment or hours of work. For the households with at least one worker, the poverty rate is estimated to fall from 10.50 to 10.38 percent. This is a 0.12 percentage-point decline, or a 1.14 percent decrease in the poverty rate among working households. For households with at least one minimum wage worker, the poverty rate is estimated to fall from 26.69 to 24.20 percent. This is a 2.49 percentage-point decline, or a 9.33 percent decrease in the poverty among these households. Thus, although increases in minimum wages would be unlikely to have a substantial impact on the poverty rate among all households, they could have much larger effects among households with minimum wage workers. It is important to emphasize the rarity of this second subpopulation; only 3.4 percent of all households in our sample contain a minimum wage worker.

The next row in Table 5 shows what could happen to poverty rates among all three groups of households if minimum wages directly increased earnings by 10 percent, but indirectly reduced hours of work by 3 percent. This choice of a subsequent 3 percent loss in earnings through fewer hours of work is in line with the summary of early empirical evidence on the detrimental effects of the minimum wage from the employment loss found in Brown *et al.* (1982).[15] Not surprisingly, this assumption of a less-than-offsetting reduction in hours of work stemming from a 10 percent increase in minimum wages makes the already small antipoverty effects among the first two groups of households even smaller. The reduction in the poverty rate among all households is 0.05 percentage points or 0.23 percent. The reduction in the poverty rate among working households is 0.07 percentage points or 0.67 percent. Only among the small subpopulation of households currently with a minimum wage worker would we continue to see a larger antipoverty effect from a higher minimum wage (the poverty rate falling by 1.52 percentage points). This drop equates to a 5.70 percent reduction in the poverty rate among households with a minimum wage worker.

Finally, any antipoverty effects from the minimum wage are almost entirely attributable to the increase in earnings experienced by adult workers. If we added 10 percent to the earnings of teenage workers only, the poverty rate among all households in our sample would remain essentially unchanged. It would decline by only 0.01 percentage points for households with an employed member and by 0.16 percentage points for households with a minimum wage worker. The antipoverty effects of raising the minimum wage for teenagers are particularly weak because less than one-third of minimum wage workers are teenagers, and they are relatively more equally dispersed across the income distribution.

[15]Leigh (2007), in his simulations of a 10 percent increase in the Federal minimum wage in Australia, assumes a larger decline in labor demand of 10 percent in his "worse case" scenarios.

6. Conclusions

After experiencing few changes to effective minimum wages during the 1990s, NZ substantially raised the adult minimum wage and eliminated the gap between the teenage and adult minimum wages after 2000. Between September 1999 and September 2008, real minimum wages increased by 122.8 percent for teenagers and 32.9 percent for adults. As a consequence, the country went from a situation where very few workers were paid the minimum wage to one where this was true for nearly one out of every ten adult workers and one out of every two teenage workers. This recent episode in NZ's history provides an excellent opportunity to study the possible labor market effects associated with substantial increases in the real minimum wage.

We define minimum wage workers in this study as individuals with usual hourly earnings within a narrow band on either side of the current or previous statutory minimum wage for their age group. Annual data from the Income Supplements to the Household Labour Force Survey between 1997 and 2008 are used for this analysis. They show that workers who are female, Maori, or Pacific Islanders, without formal educational qualifications, part-time employees, and those located in the retail, accommodation, and cafe and restaurant industries are all relatively more likely to work for the minimum wage. These workers have experienced the largest increases in minimum wage incidence since 1997.

We find that minimum wage workers tend to be concentrated in the lowest income deciles. Approximately 40 percent of minimum wage workers live in households from the bottom three income deciles (equivalized for household size). Yet, more than 16 percent of minimum wage workers live in households from the top three income deciles. There was no evidence of a clear change during the sample period in the overall dispersion of minimum wage workers across the income distribution. However, our regression analysis suggests that, without the substantial increases in real minimum wages over this period, minimum wage workers would have become more equally dispersed across the income deciles. We find that increases in both teenage and adult minimum wages result in a greater concentration of minimum wage workers in the bottom of the income distribution.

The incidence of minimum wage work varies considerably across the distribution of household income. A given worker in the lowest income decile is many times more likely to work for the minimum wage than a given worker in the highest income decile. The largest absolute percentage-point increases in minimum wage incidence stemming from the substantial increases in both teenage and adult minima in NZ occurred in the lowest income deciles. By 2006–08, the minimum wage incidence rates for workers in the bottom and top income deciles were 32.9 percent and 3.2 percent, respectively. Our regression analysis confirms that the majority of these increases in minimum wage incidence were linked to increases in statutory minimum wages. Increases in adult minimum wages were relatively more important at explaining rises in incidence rates in the lower income deciles, whereas teenage minimum wages had slightly larger marginal effects in the higher income deciles.

Finally, poverty simulations suggest that a 10 percent increase in minimum wages, without any offsetting reduction in earnings due to an associated loss in

employment or hours of work, would lower the poverty rate (defined as living in a household below 50 percent of median equivalized household income) by less than one-tenth of a percentage point. This small impact is due to the fact that many low income households do not contain working members who could take advantage of higher minimum wages to boost household income, and many minimum wage workers do not live in poor households.

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