Understanding the Implications of Raising the Minimum Wage in the District of Columbia

GREGORY ACS, LAURA WHEATON, MARIA ENCHAUTEGUI, AND AUSTIN NICHOLS

JULY 2014

URBAN INSTITUTE

The authors would like to thank Joyce Morton for her work preparing the simulation models for this analysis; Linda Giannarelli for her guidance on the simulation methodology; Elizabeth Forney, Martha Johnson, Kye Lippold, and Erika Huber for their research, editorial, and production assistance; and Jonathan Schwabish for his comments on earlier drafts. Any errors in this report are solely those of the authors.

The nonprofit Urban Institute is dedicated to elevating the debate on social and economic policy. For nearly five decades, Urban scholars have conducted research and offered evidence-based solutions that improve lives and strengthen communities across a rapidly urbanizing world. Their objective research helps expand opportunities for all, reduce hardship among the most vulnerable, and strengthen the effectiveness of the public sector.

Urban strives for the highest standards of integrity and quality in its research, analyses, and policy recommendations. Urban scholars believe that independence, rigor, and transparency are essential to upholding those values. Funders do not determine research findings or influence scholars' conclusions. As an organization, the Urban Institute does not take positions on issues. Urban scholars and experts are independent and empowered to share their evidence-based views and recommendations shaped by research.

The views expressed are those of the authors and should not be attributed to the Urban Institute, its trustees, or its funders.

This report was submitted to the District of Columbia Department of Employee Services. The work associated with this project was done under Urban project number 08322-030-00, task order number CW 25444, and contract number GS-23F-8198H.

Contents

Executive Summary

The minimum wage establishes a lower bound on what employers must pay their workers. The federal minimum wage is currently set at $7.25 an hour, but 22 states and the District of Columbia (DC) have established minimum wages above the federal minimum. Today, DC's minimum wage is set one dollar higher than the federal minimum ($8.25), while the minimum wage in the neighboring jurisdictions of Maryland and Virginia use the federal minimum wage. However, DC and two neighboring counties in Maryland (Prince George's County and Montgomery County) have passed legislation raising their minimum wages to $11.50 an hour by 2016 and 2017, respectively. This report examines the potential effects of raising DC's minimum wage on DC workers, their families, and on the government programs that serve them.

Data and Methods

Our data on DC workers come from the 2009, 2010, and 2011 American Community Surveys (ACS). We reweight the data to represent DC's population in 2011 and use the TRIM3 microsimulation model to examine workers' use of public assistance programs under current law and to simulate earnings and program use under the new, higher minimum wage. We then use population projections to reweight the data to show the effect of the $11.50 per hour minimum wage in 2016. We assume that workers paid between $5.50 an hour and $13.50 an hour (in 2016 dollars) would be affected by the new minimum wage. (Reported or calculated wages just below the minimum wage may be subject to measurement error, so we consider those workers subject to the minimum wage. We also assume that the higher minimum wage will have spillover effects providing a modest bump in wages to those earning just about the new minimum.)

We present results under three different assumptions about the employment effects of raising the minimum wage:

1. employment is unaffected by raising the minimum wage;
2. employment of workers with wages under the new minimum falls by 1 percent for every 10 percent rise in their wages; and
3. employment among workers age 24 and under who earn less than the new minimum wage falls by 1 percent for every 10 percent rise in their wages.

Key Findings

How Many Workers Are Likely to Be Affected?

We estimate that, in 2016, approximately 41,000 individuals live and work in DC who will be affected by the rise in the minimum wage to $11.50 an hour. Among all low-wage workers who live *or* work in DC, 38 percent live *and* work in DC, 11 percent live in DC but work elsewhere, and 51 percent work in DC but live elsewhere.

What Are the Characteristics of Workers Likely to Be Affected?

About one out of five affected workers lives in families with incomes below the federal poverty level. Another 35 percent are in near-poor families, with incomes between 100 and 200 percent of the poverty level. About one-quarter live in middle- to upper-income families with incomes above 300 percent of the poverty level.

About one out of five affected workers is under the age of 25; over 60 percent are between the ages of 25 and 54. Seventy percent of affected workers are unmarried and do not live with children; 11 percent are single parents and 8 percent are married parents. Over half the affected workers are African American and over one-fifth are Hispanic. Four out of five are US citizens.

Almost one-quarter of workers who live and work in DC and would be affected by the rise in the minimum wage have less than a high school degree. Nearly one-quarter has only a high school degree, while 28 percent have a 4-year college degree or more education.

What Are the Employment Characteristics of Workers Likely to Be Affected?

Two-thirds of affected workers work 48 or more weeks during the year, and 70 percent usually work 35 or more hours a week. Four out of five affected workers are employed in the private sector. The three most common industries of employment for affected workers are food services (16 percent), health and social services (14 percent), and retail trade (11 percent). The three most common occupations for affected workers are food preparation (16 percent), building and grounds cleaning and maintenance (13 percent), and administrative support (13 percent).

What Government Benefits Are Affected Workers Receiving?

About 33 percent of affected workers receive the earned income tax credit (EITC), and 28 percent receive Supplemental Nutrition Assistance Program (SNAP) benefits (formerly called food stamps). Of the affected workers, 15 percent receive Low Income Home Energy Assistance Program (LIHEAP) benefits, 13 percent receive housing assistance, 9 percent receive child care subsidies, and 7 percent participate in the Special Nutrition Program for Women, Infant, and Children (WIC). Only 5 percent receive Temporary Assistance for Needy Families (TANF) or related cash assistance.

What Is the Effect on Families' Earnings and Incomes?

If all affected workers keep their jobs pursuant to increasing the minimum wage to $11.50 an hour, half of families affected by the minimum wage increase would see their earnings rise by more than $1,500 a year. About one-quarter would see their earnings rise by less than $500 a year. Although some of the increase in earnings will be offset by reductions in government benefits and tax credits, almost 80 percent of affected families will keep at least half of their earnings gains.

Even under scenarios in which employment falls by 1 percent for every 10 percent rise in wages, about half of affected workers would still experience annual earnings gains of more than $1,500, and more than 70 percent would keep at least half of their earnings gains.

Affected workers living in families with incomes below the federal poverty level would experience a median rise in earnings of about $840 a year and a rise in median incomes of about $450 a year. Those living in near-poor families would experience median earnings increases of $1,835 and median income increases of about $880. Those living in families with incomes above twice the poverty level would, on average, experience increases in earnings of about $1,600 and increases in incomes of about $1,050.

Under the assumption that employment would decline by 1 percent for every 10 percent rise in wages, we find that about 1 percent of workers in poor families, 2.4 percent of workers in near-poor families, and 0.7 percent of workers in families with incomes above twice the poverty level would experience earnings declines.

The median changes in earnings and incomes by income class (below the poverty level, between 100 and 200 percent of the poverty level, and above 300 percent of the poverty level) do not vary across the three employment scenarios we consider.

Even under the scenario in which the employment of all affected workers with wages below $11.50 falls by 1 percent for each 10 percent rise in wages, total employment among affected workers in 2016 falls by only 471 workers. This likely reflects the fact that most affected workers already earn near the new minimum wage.

What Is the Effect on Public Assistance Program Participation?

Regardless of the employment scenario considered, the number of DC residents receiving the federal EITC and DC EITC would decline by about 3 percent and 2.5 percent, respectively. Caseloads for SNAP, TANF, and Supplemental Security Income (SSI) would fall by nearly 2 percent. The number of families receiving LIHEAP would fall by about 3.5 percent, and benefits from other programs will decline slightly. For programs funded through block grants, DC could continue to use all the funds available to extend benefits and services to additional families. Our analysis does not capture the effect of this change.

Under the higher job loss scenario, there would be a 3.4 percent increase in the number of people receiving unemployment compensation during the year and a 3.8 percent increase in annual unemployment compensation benefits. If job loss occurs only among youth, the number of recipients would increase by 1 percent and annual benefits would rise by 0.8 percent.

Understanding the Implications of Raising the Minimum Wage in the District of Columbia

The District of Columbia (DC) will increase the minimum hourly wage employers must pay their covered workers from $8.25 an hour to $11.50 an hour by 2016. Increasing the minimum wage in DC will have implications for the employment opportunities and incomes of DC families as well as for DC employers and the DC government. Proponents of raising the minimum wage see it as a way to help low-income families support themselves, while critics contend that it will raise employers' costs, driving some out of business or at least out of DC, and ultimately lead to job losses among the very low-wage workers whom proponents seek to help. Employers may also pass the cost of a rising minimum wage on to consumers in the form of higher prices.

The geographic, demographic, and economic characteristics of DC highlight the complexity and importance of minimum wage policies. Its minimum wage in 2016 will be well above the federal minimum wage and the minimum wage in neighboring Virginia. The Maryland counties closest to DC are also raising minimum wages to $11.50 an hour (by 2017), but the state as a whole and other nearby counties, such as Howard and Carroll, are not contemplating raising the minimum wage to that level. A substantially higher minimum wage in DC may lead employers to leave for surrounding jurisdictions, costing the city jobs, while it may draw more workers in from those jurisdictions to compete for jobs with local residents. Demographically, almost two-thirds of DC's population (62 percent) is black, Asian, and Latino compared with 34 percent of the US population. DC's population is also 4 years younger, on average, than the population of the United States as a whole. In DC, 13.2 percent of the population is between the ages of 18 and 24 in comparison with 10 percent of the United States. Research shows that workers of color, workers in the service industries, single mothers, and younger workers are more likely be paid minimum wage (Bureau of Labor Statistics 2013) and are thus more affected by minimum wage policies. Finally, most employment in DC is geared toward service industries. The goods-producing industries, such as manufacturing, natural resources, and construction, account for less than 5 percent of all employment in DC but 19 percent in the United States. Service-sector jobs tend to pay less than jobs in goods-producing sectors and hence are more likely to be affected by minimum wage policies.

This report examines the potential effects of raising DC's minimum wage on DC workers, their families, and on the government programs that serve them. Using data from the American Community Survey (ACS) as processed through and augmented by the TRIM3[1] microsimulation model, we find that about 41,000 individuals who live and work in DC would be affected by the $11.50 an hour minimum wage in 2016. Thirty percent have wages near the current minimum wage ($8.25 an hour), while 45 percent earn near or slightly above the new minimum wage ($11.50 an hour). Because so many affected workers would have had earnings near the new minimum wage, raising the minimum wage would have only modest effects on earnings and commensurately modest effects on employment. Further, because the majority of the workers affected by the minimum wage (70 percent) are unmarried and do not co-reside with children, their participation in public assistance programs and receipt of tax subsidies are also somewhat limited and the effects of the higher minimum wage on DC government programs are fairly small.

In the following sections, we review prior research on the minimum wage, describe our approach for assessing the implications for raising the minimum wage, present our main findings, and conclude with a discussion of our findings, issues beyond the scope of this report, and the limitations of this study.

Background and Literature Review

The minimum wage establishes a lower bound on what employers must pay their workers. The United States introduced the federal minimum wage in 1938. Initially set at $0.25 an hour (the equivalent of $4.15 today), the federal minimum wage has been raised on multiple occasions, most recently in 2009, and it is currently set at $7.25 an hour. After nearly a decade of no increase in its nominal value and despite periodic increases in the federal minimum wage, it is lower today, after accounting for inflation, than it was in 1976 ($9.45 an hour in today's dollars), although it is somewhat higher than it was in 1989 ($6.32 an hour in today's dollars). In addition to setting a nominal value for the minimum wage, the federal government determines to which workers it applies. For example, certain agricultural workers are not covered by the federal minimum, and the federal government allows for lower minima for workers who receive a large portion of their compensation through tips as well as for younger workers in their initial months on the job.[2]

States, cities, and counties use minimum wages and living wage ordinances to provide additional supports to low-wage workers. Currently, 22 states and DC have established minimum wages above the federal minimum. DC's minimum wage is set one dollar higher than the federal minimum ($8.25 today), while the minimum wage in the neighboring jurisdictions of Maryland and Virginia use the federal minimum wage of $7.25 an hour. DC's minimum wage is slated to rise to $11.50 an hour in 2016; the minimum wage in the two Maryland counties bordering DC (Prince George's and Montgomery counties) will also raise their minimum wages to $11.50 an hour. DC and other jurisdictions also have ordinances that require employers who have contracts with those jurisdictions above a certain value to pay their workers at least a "living wage." Living wages are generally higher than minimum wages; DC's living wage is $12.50 an hour.

Minimum wage policy has implications for the economy beyond increasing hourly earnings for low-wage workers. Its implications for employment and poverty are widely discussed, but it also affects worker productivity, job benefits, locational decisions, labor force participation, and government program participation. A broad base of empirical and theoretical research exists on employment and poverty effects, and an increasing number of studies have addressed its other implications (Belman and Wolfson, forthcoming; Doucouliagos and Stanley 2009; Neumark and Wascher 2006, 2008; Schmitt 2013). Here, we first review the theories that generate hypotheses about minimum wage effects and then survey the empirical evidence pertaining to the questions addressed in this report:

- What will the impact of the enacted minimum wage increase be on employment in DC?
- What effect will this increase have on family income, poverty, and the use of income support programs, such as the Supplemental Nutrition Assistance Program (SNAP), Temporary Assistance for Needy Families (TANF), public housing, and earned income tax credits (EITCs)?
- Who would be the main beneficiaries of a minimum wage increase, and who could be negatively affected?

Minimum Wage Theories

The neoclassical model of competitive labor markets predicts that, in a competitive labor market, setting the price of labor above the competitive wage will cause an oversupply of labor relative to demand, resulting in unemployment. While most economists take the competitive model as the starting point, some researchers argue that market imperfections are so pervasive that a noncompetitive model should be the point of departure, with the competitive model as a special case (Kaufman 2010, referenced in Aaronson, French, and MacDonald 2008). Alternative models that focus on labor market imperfections allow for a wider variety of minimum wage effects, some of which result in higher equilibrium employment.

In the competitive model, which is predicated on strong assumptions, all firms are identical and have no power to determine their own wage, and workers can move in and out of jobs at no cost and have complete information about wage and work alternatives. With these assumptions, everyone who wants to work at the prevailing wage is able to find work. A minimum wage set above this competitive wage disrupts the equality between demand and supply for labor. It encourages more workers to enter the low-wage labor market at the same time that it encourages employers to reduce reliance on low-wage labor. The higher the ratio of the new minimum wage to the market wage, the greater the "genuine economic bite" (Castillo-Freeman and Freeman 1992).

Even in the competitive model, it is not evident that a higher minimum wage results in a net welfare loss for affected workers; some workers become unemployed, but those who remain employed earn more. The net effect on aggregate earnings for low-wage workers depends on the change in employment relative to the change in wages (Danziger 2009; Freeman 1996).

Monopsony is the most discussed alternative to the neoclassical model. Although the monopsonic market traditionally contains one employer, as in the case of the company town, it can be applied to markets with multiple employers (Borjas 2005, 198), whose market power derives from mobility costs that tie workers to their current employer, even when the workers' wages are below their contribution to the firm (Aaronson, French, and MacDonald 2008). Though a monopsonistic employer pays wages below workers' productive worth, its cost of hiring is relatively high, because each time the employer wishes to hire, it must increase wages for all workers. When a minimum wage is imposed above the monopsonist's wage, the cost of hiring an additional worker falls, which leads to increased employment in the monopsonic market (Danziger 2010).

The institutional approach provides additional insights about the effects of minimum wage hikes. Institutionalists look at bodies of rules, power relations, property rights and social costs, thus allowing for the focus to shift from employment to labor standards. In this context, minimum wage policy is intended to prevent unrestrained competition in labor markets from lowering labor standards and uphold labor practices that preserve the efficiency, health, and well-being of workers (Douglas and Hackman 1939; Kaufman 2010). Institutionalists contend that the competitive model is incomplete (rather than wrong) and that, upon considering the institutional context, employment effects of a minimum wage are zero or minimal. The relevance of institutional arrangements in minimum wage effects is demonstrated in an international comparison made by Neumark and Wascher (1992). In that analysis, the negative effects of minimum wage are the strongest in countries with the least regulated labor markets, such as those without employment protection laws, unionization, and active labor market policies.

The efficiency wage model, another alternative to the competitive model, posits that not only are wages a function of productivity, but they can also directly affect productivity. In what Akerlof (1982) calls a "gift exchange" between employers and workers, a worker may work above the expected norm, seeking to guarantee his/her job. Employers in this model offer wages above the competitive level and receive higher productivity in return. In this context, a higher minimum wage reduces incentives to shirk, which, in turn, lowers supervision costs and, thus, can increase employment (Georgiadis 2013).

Empirical Findings on the Effects of a Minimum Wage Increase

In table 1, Panel A summarizes the findings of 12 studies published since 2008 estimating the employment effects of minimum wages and focusing on the United States, including meta-analyses. We selected these studies based on how recently they were published, since the latest studies have not yet been included in other reviews and meta-analyses, and how relevant they are to our research. Most studies use pooled cross-sectional data across time, mainly from the Current Population Survey (CPS).

The effects of minimum wage increases are identified through variations in minimum wages across states and over time. While states have enacted minimum wage policy in different ways and in different years, currently 22 states and the District of Columbia have wage floors above the federal minimum wage.[3] A few of the studies in Panel A focus on local areas, and many focus on workers thought more likely to experience job loss following minimum wage hikes, such as teenagers and workers in the food or retail sectors. A few also study impacts on employment creation and turnover. Results are typically expressed as elasticities; for example, an employment effect of -0.01 indicates that a one percent increase in the wage rate results in a tenth of a percent reduction in employment.

Panel B, in table 1, presents statistical studies of minimum wage effects on poverty and program use. Panel C presents a broad array of findings from studies that illustrate the effects of changes in the minimum wage using simulation models that draw upon assumptions about how a change in the minimum wage influences individual and employer behavior.

TABLE 1

Recent Studies on Minimum Wage Effects, by Type

Citation	Population focus	Dataset	Methodology and assumptions	Results
		Panel A: Employment Effects		
		Meta-Analyses		
Belman and Wolfson, forthcoming	Workers in the United States	Narrowed 75 analyses on employment effects published from 2001 to 2013 down to 23	Meta-analysis	• Employment effect: significant effects found among youth in the food and drink sector: from -0.01 to -0.07
Doucouliagos and Stanley 2009	Teenage workers in the United States	Narrowed about 100 studies on teenage employment impacts published from 1972 to 2007 down to 64	Meta-analysis	• Employment effect: -0.01 among teenagers
		Regression Analyses		
Addison, Blackburn, and Cotti 2012	Workers in the US restaurant-and-bar sector	BLS Quarterly Census of Employment and Wages payroll data 1990–2005	• County-quarter panel study 1990–2005 • Examines employment and earnings effects	• Employment effect: no significant effect in restaurant-and-bar sector • Suggests that effects vary geographically and by type of firm (i.e., full-service vs. limited-service restaurants)
Addison, Blackburn, and Cotti 2013	Teenagers, restaurant-and-bar workers in the United States	BLS Quarterly Census of Employment and Wages and the CPS 2005–10	• County-quarter panel study 2005–10 • Examines employment and earnings effects in a recessionary environment	• Employment effect (BLS data): no significant effect overall, but -0.02 among workers in the limited-service restaurant-and-bar sector • Employment effect (CPS data): no significant effect overall, but -0.18 among teenagers
Allegretto, Dube, and Reich 2011	Teenagers, by race/ethnicity in the United States	CPS outgoing rotation group data for 1990–2009	• State-year panel study 1990–2009 • Examines employment and hours	• Employment effect: -0.1 without regional controls, and 0 with them • Suggests importance of controlling for different employment trends across states

TABLE 1 CONTINUTED

Citation	Population Focus	Dataset	Methodology and Assumptions	Results
Coomer and Wessels 2013	Workers in the United States	CPS outgoing rotation groups for 1987–2001, quarterly data	• State-year panel study 1987–2001 • Examines employment-to-population ratios for covered and uncovered teenage workers	• Employment effect: 0 to -0.2 overall • Minimum wages reduce covered employment significantly more than total employment
Dube, Lester, and Reich 2010	Restaurant employees in the United States	Quarterly Census of Employment and Wages 1990–2006	• County-year panel study 1990–2006, using policy discontinuities at state borders • Examines earnings and employment in restaurants and other low-wage sectors	• Employment effect: no significant effect among restaurant employees • Suggests importance of controlling for local economic conditions
Giuliano 2013	Teenagers and adults in a single firm, with locations across the United States	Personnel data from a large US retail firm 1996–98	• Establishment-level cross-sectional study of response to 1996 minimum wage increase • Examines wages and employment by type of worker	• Employment effect: no significant effect among adults, but 0.6 to 0.9 among teenagers • Younger and more affluent teenagers enter the labor market in response to higher relative wages (displacing young adults)
Meer and West 2013	Workers in the United States	Business Dynamics Statistics administrative panel data on private employers 1977–2009	• State-year panel study 1977–2009 • Examines employment dynamics at employer level	• Employment effect: no significant effect • Significant negative effect on new hiring, with an elasticity of -0.14
Neumark and Wascher 2011	Individuals and families in the United States	Annual CPS for 1997–2006	• State-year panel study 1997–2006 • Examines effect of EITC and minimum wages together on individual and family employment and earnings	• Employment effect: A higher minimum wage amplifies the positive labor supply response of the EITC for single mothers (particularly for less-educated and minority mothers) • Suggests that for less-skilled minority men and for women without children, employment and earnings are more adversely affected by the EITC when the minimum wage is higher
Orrenius and Zavodny 2008	Immigrants, teenagers in the United States 1994–2005	CPS outgoing rotation group data for 1994–2005	• State-year panel study 1994–2005 • Examines effect of minimum wage on employment-to-population ratios, average weekly hours worked, and average hourly earnings	• Employment effect: no significant effect among adult immigrants or natives who did not complete high school, -0.18 among teenagers • Immigrants may have responded to changes in minimum wages in their locational choices
Sabia, Burkhauser, and Hansen 2012	Individuals ages 16 to 29 who did not complete high school, in New York state	Monthly CPS for 2004 and 2006	• Difference-in-difference study from 2004 to 2006 • Examines employment rates by age group and high school completion	• Employment effects: -0.7 overall among population of interest, -1.01 among teenagers, -0.314 among dropouts ages 25 to 29 • No significant employment effect among 20- to 29-year-olds who completed high school

TABLE 1 CONTINUED

Citation	Population Focus	Dataset	Methodology and Assumptions	Results
			Panel B: Poverty and Program Effects	
DeFina 2008	Children living in female-headed households in the United States	Annual CPS for 1991–2002	• State-year panel study 1991–2002 • Examines effects of a minimum wage increase on poverty	• Poverty effect: -0.4 elasticity • EITC interacts with minimum wage to increase antipoverty effects
Dube 2013	Nonelderly individuals' family outcomes	Annual CPS for 1990–2012	• State-year panel study 1995–2005 • Examines effect of minimum wage on the distribution of family incomes	• Poverty effect: elasticity of -0.24 • Effects are larger for minority individuals (-0.4), smaller for single mothers (-0.16) and young adults (-0.2)
Sabia 2008	Single mothers in the United States	Annual CPS for 1991–2004	• State-year panel study 1991–2004 • Examines effects of a minimum wage increase on measures of poverty	• Poverty effect: no significant effect among working single mothers • Suggests that some single mothers were lifted out of poverty because of positive wage effects, while others had incomes decline because of negative employment and hours effects
Sabia and Nielson 2013	Families in the United States	Survey of Income and Program Participation, panels for 1996, 2001, and 2004	• State-year panel study 1996, 2001, and 2004 difference-in-difference • Examines effects of a minimum wage increase on poverty, material hardship, and hardship-related government program participation	• Poverty effect: no significant effect • Material hardship effect: no significant effect • Hardship-related program participation: no significant effect
West and Reich 2014	SNAP recipients	Annual CPS for 1990–2012, state administrative data	• State-year and family-year panel study 1990–2012 • Examines effect of minimum wage on SNAP enrollment and expenditures	• SNAP state expenditure effect: elasticity of -0.19 • SNAP state enrollment effect: elasticity of -0.235 • Effects are for states with a $7.25 minimum wage in 2014
			Panel C: Simulation Studies	
Alsalam, Carrington, Dahl, and Falk 2014	Monthly and Annual CPS	All workers in the United States the second half of 2016, using CBO projections	• Includes workers with observed wages from below the current minimum by up to 25 cents, to above the proposed minimum by up to half of the amount of the effective dollar increase • Employment elasticity: -0.1 for teenage workers, and -0.033 for other adults	• 16.5 million workers with higher weekly earnings • 20 percent of earnings increases captured by families below poverty, or about $5 billion • 900,000 fewer individuals in poverty • 500,000 workers lose their jobs (imprecise estimate)

TABLE 1 CONTINUED

Citation	Population Focus	Dataset	Methodology and Assumptions	Results
Formby, Bishop, and Kim 2010	All workers in the United States 2006	Annual CPS and outgoing rotation group data for 2006	• Assumes workers earning less than the current minimum wage receive the same percentage increase as the minimum wage increase • Assumes that wage spillovers do not extend above the bottom quintile of the wage distribution. • Employment elasticities: from -0.65 for nonwhite and non-Hispanic teenagers to 0.05 for all Hispanic workers and non-Hispanic high school dropouts	• Affects 15 percent of families below 200 percent of poverty level, or 9 percent without the trickle-up spillover effect • 10.9 percent of benefits are captured by families below poverty level • 32.7 percent of benefits are captured by families below 200 percent of poverty level
Giannarelli, Morton, and Wheaton 2007	All workers in the United States in 2007	Annual CPS and outgoing rotation group data for 2003	• Simulates with and without spillover effect on workers with below current minimum by up to $1 and above the proposed minimum by up to $1 • Employment elasticity: -0.06 for both teenagers and adults	• 205,000 fewer individuals in poverty, 475,000 fewer with spillover and disemployment effects • $750 million net revenue, $2.1 billion with spillover and disemployment effects
Sabia and Burkhauser 2010	All workers in the United States in 2007 and 2008	CPS outgoing rotation group data for 2007 and 2008	• Assumes workers earning less than $0.15 below the current minimum wage or more than the proposed minimum are unaffected • Employment elasticities: Various elasticities tested	• 10.5 percent of simulated benefits (earnings plus unemployment compensation) go to workers in poor households • $4 billion in monthly benefits without disemployment assumption, $2.84 billion in monthly benefits with disemployment assumption
Sawhill and Karpilow 2014	All workers in the United States 2011	Annual CPS for 2011	• Some CPS respondents are assigned wages slightly above the current minimum wage in order to better match the ORG distribution • Include hourly and nonhourly workers with earnings from the current minimum wage up to the proposed minimum wage, with no spillovers • Employment elasticity: 0	• Affected households below poverty experience a 13 percent increase in household earnings, 8 percent for those below 200 percent of poverty • Affected workers receive about $46 billion in additional wages • The earnings boost of $2,049 (10 percent on average) among affected childless workers is over four times the earnings supplement (EITC) for single tax filers with no dependents
		DC Simulations		
Cooper 2013	All workers in the United States 2013–16. Results for workers living in DC.	CPS outgoing rotation group data for 2012 and 2013	• Affected workers have observed wages below the proposed minimum and up to a wage equal to the proposed minimum plus the dollar amount of the increase • Employment elasticity: 0	• For DC, 35,000 affected workers, representing 11 percent of the total DC workforce • $48 million additional earnings among all affected workers in DC • Suggests job creation from growth in gross domestic product

TABLE 1 CONTINUED

Citation	Population Focus	Dataset	Methodology and Assumptions	Results
Neumark, Lamoreaux, and Turner 2013	All workers in DC 2014–17	American Community Survey for 2011	• Affected workers are those with observed wages below the current minimum wage • Assumes that workers making more than the proposed minimum wage are unaffected • Employment elasticity: 0, but suggests that empirical evidence supports a -0.1 to -0.3 elasticity among the least-skilled workers	Beneficiaries of the wage increases are likely to be composed of approximately • 39 percent DC residents • 24 percent workers from families below poverty level • 23 percent white (non-Hispanic) • 45 percent black (non-Hispanic) • 24 percent Hispanic • 7 percent teenagers (16–19 years old); and • 35 percent youth (16–24 years old)

Notes: BLS = Bureau of Labor and Statistics; CPS = Current Population Survey; ORG = Outgoing Rotation Group; SNAP = Supplemental Nutrition Assistance Program.

Employment Effects

The estimated effect of a minimum wage on employment varies based on the type of workers considered, with larger effects detected among teenage workers than among adult workers. In an extensive 2006 review, Neumark and Wascher conclude that evidence supports negative employment effects among low-wage workers, but the effects are not always statistically significant. Although some economists judge the evidence to support larger effects (Neumark and Wascher 2008; Sabia, Burkhauser, and Hansen 2012), others find no statistically significant effects at all. Of the research listed in Panel A, representing the most recent scholarship, Dube, Lester, and Reich (2010), Allegretto, Dube, and Reich (2011), Meer and West (2013), Addison, Blackburn, and Cotti (2012), and Giuliano (2013), all report statistically insignificant effects of the minimum wage on employment, although two of these studies and a few others noted in table 1 find disemployment effects for certain subgroups. In a review of studies published since 2000, Belman and Wolfson (forthcoming) conclude that raising the minimum wage reduces employment, but that the effects "are statistically detectible but small." For all low-wage workers, raising the minimum wage by 10 percent reduces employment by 1 percent or less. Based on its review of the literature for a recent study, a 2014 Congressional Budget Office (CBO) report assumes that a 10 percent rise in the minimum wage is associated with about a 0.33 percent drop in employment for all adults (2014).

Two recent meta-analyses of the impact of minimum wage on teenagers find persistent, small effects. Doucouliagos and Stanley (2009) review 64 studies published between 1972 and 2007 and find that a 10 percent increase in the minimum wage leads to a 0.1 percent decline in teenage employment. In their forthcoming meta-analysis of recent studies, Belman and Wolfson conclude that a 10 percent rise in the minimum wage reduces youth employment in the food and drink sector by 0.1 to 0.7 percent. CBO (2014) assumes that an increase of 10 percent in the minimum wage results in a 1 percent decline in employment for teenage workers.

Various studies have gone beyond the effects of minimum wage on employment levels and consider other employment-related outcomes. For example, Meer and West (2013) argue that employers are reluctant to dismiss workers and that the effect of minimum wage is shown in employment growth rather than in employment levels, with a 10 percent increase in the minimum wage associated with a 1.36 percent decrease in hiring. Hirsch, Kaufman, and Zelenska (2011) examine restaurant payroll records and conclude that the higher minimum wage is associated with "higher prices, lower profit margins, wage compression, reduced turnover, and higher performance standards." In particular, turnover rates fell

from 10 to 5 percent in their sample over the same three-year period that the minimum wage rose from $5.15 to $7.25. Similarly, Dube, Lester, and Reich (2012) find evidence that a higher minimum wage reduces job turnover, separation, and hiring.

Poverty and Program Effects

Opponents of minimum wage policy argue that the minimum wage is an ineffective tool to reduce poverty. Card and Krueger (1995) note that many who are poor do not benefit from minimum wage laws, while Sabia and Burkhauser (2010) emphasize that, increasingly, people who benefit from the minimum wage are not poor. The majority of workers who benefit from increases in the minimum wage do not belong to households beneath even 150 percent of the poverty level (Neumark and Wascher 2008; Sabia and Burkhauser 2010).

Even if the minimum wage is poorly targeted, it can still have substantial benefits for the poor families it does reach. Dube (2013) finds a significant antipoverty effect of the minimum wage in a 10-year state panel study, and simulation studies have consistently shown minimum wage increases to increase earnings and income and reduce poverty among some workers and their families.

Simulations that consider a variety of possible employment effects show what could happen to workers' incomes and poverty levels if the minimum wage increases. CBO (2014) simulates an increase to a $10.10 minimum wage by 2016 and concludes that it would reduce the number of people below the federal poverty level by 900,000 (a decrease of about 0.3 percentage points in today's poverty rate). Sawhill and Karpilow (2014) find that the increase to $10.10 raises earnings for households in poverty by $1,800. In a study that predates the most recent minimum wage increase, Giannarelli, Morton, and Wheaton (2007) simulate an increase in the federal minimum wage from $5.15 to $7.25 and find it to reduce poverty by about 0.6 percentage points.

Interaction with Income Support Programs and the Earned Income Tax Credit

A compelling angle in the push for a higher minimum wage comes from observing the high use of government antipoverty programs by low-wage workers, indicating that raising the minimum wage would result in savings for taxpayers. Allegretto and colleagues (2013) find that a majority of fast-food workers receive some type of government aid. A report by the National Employment Law Project (NELP) calculates that the low wages paid to workers in the top 10 fast-food chains cost taxpayers $3.8 billion annually (NELP 2013).

Despite the possibility of job loss, studies find that a higher minimum wage results in an overall decrease in the population eligible for various means-tested programs (Allegretto et al. 2013; Giannarelli, Morton, and Wheaton 2007; Giannarelli, Lippold, and Martinez-Schiferl 2012). West and Reich (2014) find that an increase of 10 percent in the minimum wage leads to a decline in enrollment in SNAP of 2 to 3 percent, and estimate that an increase to $10.10 would reduce the number of SNAP participants by 3.1 to 3.6 million persons and produce savings of $4.6 billion.

The possibility of unemployment effects of the minimum wage hikes have generated a debate about the merits of minimum wage *vis-à-vis* the EITC as federal policies to foster the well-being of low-income workers. Some authors suggest that the EITC is preferable because it targets low-income families, provides work incentives, and avoids cost to employers (Neumark and Wascher 2011; Sabia and Burkhauser 2010). Others argue that the two policies work better in tandem (Bernstein 2004; Maag 2006; Sawhill and Karpilow 2014).

In response to findings that the EITC, by expanding labor supply, may depress wages of low-skilled workers in the labor market (Leigh 2010, Rothstein 2008), some have suggested that the minimum wage acts as a needed floor to prevent wage loss (Bernstein 2004; Levitis and Johnson 2006). Neumark and

Wascher (2011) reject this notion, suggesting that the minimum wage and EITC together bring higher-skilled single mothers who are eligible for the EITC into the labor market, crowding out lower-skilled individuals ineligible for a high EITC credit. They argue that the EITC is preferable as a less distortionary substitute for minimum wage policy. Maag (2006) argues that the EITC is not an adequate substitute. She notes that, to achieve the after-tax income effects of the $5.15 to $7.25 federal minimum wage increase, the average amount of the EITC would need to increase by several thousand dollars.

The Case of the District of Columbia

Although research on the minimum wage based on national data as well as from specific states and regions provides valuable insight into how DC's workers and families may be affected, it is important to appreciate some of the unique features of DC's economy and labor force. First, given its small geographic size and proximity to both Maryland and Virginia, many DC residents work outside DC and many DC workers live outside the city. This means some low-wage DC residents would not be directly affected by the DC minimum wage (which, by law, is set at $1 above the federal level) and some nonresidents would be affected. Further, because under current law Virginia's minimum wage is set at the federal level and is far lower than that of DC, DC residents face increased competition in the job market from out-of-district workers, and employers may shift operations to neighboring jurisdictions with lower minimum wages.

Because DC is the nation's capital, the federal government and public sector play outsized roles in the local economy and the job market is dominated by service-sector jobs. The job market is somewhat bifurcated with an abundance of both low-wage and high-wage jobs. DC is fifth highest among the largest cities in terms of inequality (Berube 2014). It also tops the list of states with high shares of low-wage workers with family incomes below $60,000 (Cooper 2013). Further, the city has a relatively high cost of living (Albeda and Boushey 2007). All of this suggests that many families are struggling to make ends meet and would benefit from higher wages.

The conundrum is that, given DC's high cost of living, employers must pay more than the minimum wage to attract workers for many jobs, and even workers earning more than the minimum wage have trouble making ends meet. A 2011 study finds that, as far back as 1993, DC set its minimum wage at a level that affected relatively few of its low-wage workers (Schmitt and Rosnick 2011). In that study, only about 10 percent earned wages in the range of the federal minimum wage of $4.25 and the DC minimum wage of $5.25. A more recent study finds that a higher minimum wage would poorly target low-income families, because of the proportion of such families without low-wage workers, low-wage workers in higher-income households, and workers who commute from adjacent counties; this study concluded that it is "hard to make the case" for a higher minimum wage in DC (Neumark, Lamoreaux, and Turner 2013). Nevertheless, even that study, which simulated the effect of raising the minimum wage to $12.50 by 2018 (a larger increase than was subsequently enacted), shows that about 40 percent of workers in families with incomes below 150 percent of the federal poverty level would benefit from a minimum wage increase.

Data and Methods

A comprehensive study of the minimum wage in DC requires data on a representative sample of low-wage workers in DC as well as those in the surrounding suburbs of Maryland and Virginia. The data must include information on the workers' earnings and hours as well as on their families' characteristics, incomes, and participation in public assistance programs. In addition, because workers may reside in one jurisdiction but work in another, it is important to know their employers' locations.

We use data from the American Community Survey (ACS) for our analysis. The ACS is a nationwide survey that provides estimates of demographic, housing, social, and economic characteristics every year

for all states, as well as for all cities, counties, metropolitan areas, and population groups of 65,000 people or more. Although the ACS does not have the detailed wage-rate information available in other datasets such as the Current Population Survey (CPS), it does provide information about work location, which is crucial for our analysis. We compute hourly wages using data on earnings and hours worked in the ACS and compare our distribution of wage rates against the CPS to confirm that we adequately capture the distribution of wages at the low end of the pay scale in DC.

Our simulations estimate the effect of the DC minimum wage increase on low-wage workers who live and work in DC. To ensure we have a sufficiently large sample for simulation, we use pooled data from the 2009, 2010, and 2011 ACS surveys.[4] The data provide information on approximately 8,100 surveyed households, of which 1,680 have incomes below 150 percent of the poverty level. Individuals living in group quarters (including college dormitories) and institutions are excluded from the analysis. Workers whose primary jobs involve unincorporated self-employment are included in the data; although they are not assigned a change in earnings, they may have a family member affected by the new minimum wage. We reweight the data to reflect DC's population in 2011 and use the TRIM3 microsimulation model (described below) to examine workers' public assistance program use under current law and to simulate their earnings and program use under the new, higher minimum wage. We then use population projections to reweight the data to show the impact of the $11.50 per hour minimum wage in 2016. Details on how we construct our analysis file and our reweighting procedures for the ACS appear in appendix A.

Like most general use national surveys, the ACS does not contain all the information analysts would ideally need to fully assess how changes to the minimum wage affect a family's income, program eligibility and participation, and net tax liabilities. The TRIM3 model corrects the ACS data for the underreporting of certain types of cash income and simulates benefit and tax amounts (including both tax credits and tax liabilities) that are not included in the ACS survey data. Further, the TRIM3 model allows us to simulate how employment, program eligibility and participation, and tax liabilities would change as workers' earnings change in response to the new minimum wage.

TRIM3 is unique in the number of programs modeled and its ability to capture interactions between programs. For example, an increase in a family's earnings may increase the family's required subsidized child care copayment and public housing rental payment and decrease the family's SNAP benefits. However, the reduction in SNAP benefits may be offset to some extent because the family now receives larger deductions for child care and shelter expenses. The family's payroll taxes will increase, and federal and DC refundable tax credits could increase or decrease, depending on where the family falls in the phase-in or phase-out ranges for various credits. A detailed description of how the TRIM3 model was used in this analysis appears in appendix B.

To assess the potential implications of raising DC's minimum wage to $11.50 an hour, we first must identify the population that will be affected by the change. We focus on low-wage workers (and their families) who both live and work in DC. Because hourly wage rates in our data are computed from reported weeks worked, usual hours worked per week, and earnings, which are all measured with error, we include a broad swath of low-wage workers in our analysis: workers with projected wages between $5.50 and $13.50 an hour in 2016. At the low end of the scale, from $5.50 to $8.25 (DC's current minimum wage), we capture a mix of workers who are earning at or near the minimum wage whose hourly earnings are imprecisely measured as well as workers not covered by the minimum wage. We assume that workers whose wages appear to be far less than the prevailing minimum wage (e.g., below $5.50 an hour) are not covered by the broad minimum wage (because they are tipped workers, have income from self-employment income, or are piece-rate workers, for example) and their wages will be unaffected by changes in the minimum wage.[5] At the high end of the scale, between $11.50 (the new minimum) and $13.50, we capture workers who will benefit from "spillover effects" from the new minimum wage. Even though they are paid at or above the new wage floor, we believe employers will increase pay for these high-end employees modestly so that they are paid more than the lowest paid, minimum-wage workers.

The size of the wage increase workers are simulated to experience varies based on the workers' pre-increase wages. A worker earning exactly $8.25 an hour (the current minimum wage) would see his/her wage rise to the new $11.50 an hour minimum wage, an increases of $3.25 an hour. Workers earning between the old and new minima would see their wages rise by less than $3.25 an hour, but their new wages would be between $11.50 and $12.50 an hour, slightly above the new minimum, so they would continue to be paid more than workers right at the minimum. Because of spillover effects pushing wages up for workers above the minimum, workers earning between $11.50 and $13.50 an hour would receive modest pay bumps; those increases phase down to zero at $13.50 an hour so that the wages of workers earning more than $13.50 an hour are unaffected. For workers with computed wages below $8.25 an hour, we simulate wage increases of somewhat less than $3.25 to reflect the uncertainty of their coverage status under minimum wage laws. Essentially, the closer the computed wage is to the current minimum wage, the larger the wage increase as workers with those wages are more likely to be minimum wage workers than workers with lower computed wage rates. Details on the specific formulae we used to simulate the wage increases appear in appendix C.

Once workers' wages rise, we must consider the possibility that some employers will choose to eliminate jobs if they cannot sustain higher labor costs. Because the extent and distribution of such disemployment effects are uncertain, we consider three separate scenarios:

1. no change in employment—workers continue in their present jobs working the same number of hours;
2. employment declines by 1 percent for every 10 percent increase in hourly wages, with job losses distributed among workers affected by the increase; and
3. employment declines by 1 percent for every 10 percent increase in hourly wages among workers under the age of 25; workers ages 25 and up experience no change in employment.

We also assume that workers paid between $11.50 and $13.50 an hour before the minimum wage rose to $11.50 would not be discharged, even though they would see their wages grow by a small amount owing to spillover effects from the new minimum wage.[6]

For all three scenarios, we assess the extent to which earnings and family income change as a result of the new minimum wage and also how those changes vary across the income distribution. In addition, we consider how program participation, tax liabilities, and receipt of the EITC and other tax credits change for affected workers.

Results

Who Will Be Affected by DC's New $11.50 Minimum Wage?

Because of its size and location, many DC residents work in neighboring jurisdictions in Maryland and Virginia, and many residents of those jurisdictions commute to jobs in DC. To assess how many of DC's low-wage workers live *and* work in DC, we examined data on workers earnings less than $11 an hour in the 2012 ACS. About half the workers earning less than $11 an hour who either lived or worked in DC commuted in from surrounding jurisdictions. Although their wages and potentially their employment could be affected by DC's minimum wage increase, they cannot participate in DC's public assistance programs nor do they pay DC income taxes. Consequently, we do not consider them in our analysis. Further, about 10 percent of low-wage workers who either lived or worked in DC were DC residents, but they worked in surrounding jurisdictions. As such, they are not covered by DC's minimum wage in their current jobs and are not considered in this analysis. This analysis focuses on the approximately 40 percent of DC low-wage workers who both live and work in DC.

We project that, in 2016, there will be about 41,000 workers living and working in DC whose wages will be affected by the new minimum wage of $11.50 an hour. These workers do not fall easily into the

common stereotypes of low-wage workers—single parents struggling to provide for their families or teenagers living with well-employed parents (table 2). About a quarter of workers affected by the minimum wage live in families with incomes above three times the federal poverty level and another fifth live in families with incomes between two and three times the poverty level. (The poverty level is about $20,000 for a family of three in 2013.) In contrast, 19 percent of workers affected by the minimum wage live in poverty and another 35 percent live in near-poor families (income between one and two times the poverty line). Thus, about half the beneficiaries of a higher minimum wage are in low-income families and about half are in higher-income families. The majority of affected workers (over 80 percent), however, do not live with their own minor children, although they may be supporting children who live in other households. Only 11 percent are single parents. Of those who do live with children, over half have a child under the age of 6. One-quarter of affected workers are the working-age children or other relative of the household head. About 19 percent of affected workers are younger workers (under age 25); over 60 percent are between the ages of 25 and 54. Slightly more than half of the affected workers are women. Most affected workers are US born (73 percent), and 19 percent are not US citizens. Consistent with the broader demographics of DC, over half the affected workers are black, non-Hispanic and almost one-quarter are Hispanic.

Over two-thirds of workers whose wages will be affected by the new minimum wage lack postsecondary degrees. About 23 percent of affected workers have not earned high school degrees, and 24 percent have a high school degree, but no additional schooling. Twenty-one percent received some postsecondary schooling but earned no additional degree, and 3 percent earned associates degrees. Nevertheless, 18 percent of affected workers hold bachelor's degrees and 10 percent have advanced degrees. Those last two groups likely include recent graduates working at short-term jobs or low-paying internships as they seek to launch their careers.

Full-time, full-year work is the norm for low-wage workers who live and work in DC (table 3). Of workers likely to be affected by the new minimum wage, 66 percent work at least 48 weeks a year, and 70 percent usually work 35 or more hours per week. Affected workers work in a variety of industries and occupations, the three most common of which are food service (16 percent), health and social services (14 percent), and retail trade (11 percent). The three most common occupations for affected workers are food preparation and serving (16 percent), building and grounds cleaning and maintenance (13 percent), and office and administrative support (13 percent). Over 80 percent of affected workers are employed in the private sector.

TABLE 2

Demographic Characteristics of Workers Who Live and Work in DC and Are Affected by the Minimum Wage Increase in 2016

Demographic characteristics		Percent affected
Family income	Below poverty level	19
	100–150 percent of poverty level	18
	150–200 percent of poverty level	17
	200–300 percent of poverty level	21
	300+ percent of poverty level	26
Age	Under 20	4
	20–24	15
	25–34	30
	35–54	32
	55 and over	19

TABLE 2 CONTINUED

Demographic characteristics		Percent affected
Education	Less than high school	23
	High school degree only	24
	Some college, no degree	21
	Associate's degree	3
	Bachelor's degree	18
	Above bachelor's degree	10
Citizenship	Not foreign born	73
	Born to Americans abroad	1
	Naturalized citizen	7
	Not a citizen	19
Race/ethnicity	Non-Hispanic, white only	21
	Non-Hispanic, black only	53
	Non-Hispanic, other	5
	Hispanic	22
Sex	Female	55
Marital status	Married	21
Marriage/parental status	Single parent	11
	Married parent	8
	Married, no kids	13
	Unmarried, no kids	68
Household relationship	Lives alone	18
	Lives with housemate(s)/partner only	23
	Married household head	9
	Spouse of household head	8
	Unmarried household head (w/family)	16
	Child (any age) of householder	14
	Other relative (any age) of householder	12
Number of children under age 19	None	81
	1	9
	2	6
	3 or more	4
Age of youngest child (among families with children under age 19)	Under 1	12
	1	8
	2–5	35
	6–11	18
	12–18	27

Source: Authors' tabulations of the 2009–11 IPUMS ACS, reweighted to reflect the estimated DC population in 2016.
Notes: Table includes persons working at least one week of the year who are directly or indirectly affected by the DC minimum wage increase. Workers are considered to be directly or indirectly affected if their estimated hourly wages (in 2016) are between $5.50 and $13.50 ($2.00 above the 2016 $11.50 minimum wage). The total weighted number of affected workers is 40,934.

TABLE 3

Occupational Characteristics of Workers Who Live and Work in DC and Are Affected by the Minimum Wage Increase in 2016

Occupational characteristics		Percent affected
Industry	Retail trade	11
	Food service	16
	Services to buildings/dwellings	8
	Health and social services	14
	Civic, religious, and professional organizations	5
	Public administration	6
	Education	11
	Other	30
Occupation	Community, social, and health care support service	7
	Education	7
	Protective service	3
	Food preparation and serving	16
	Building and grounds cleaning and maintenance	13
	Personal care and service	6
	Sales and related	10
	Office and administrative support	13
	Other	26
Sector	Self-employed, incorporated	3
	Private	81
	Federal government	7
	State government	2
	Local government	7
Usual hours worked (per week)	Fewer than 20	6
	20–34	24
	35 or more	70
Weeks worked (in the last year)	1–13	11
	14–26	9
	27–39	8
	40–47	6
	48–49	4
	50–52	62

Source: Authors' tabulations of the 2009–11 IPUMS ACS, reweighted to reflect the estimated DC population in 2016.
Notes: Table includes persons working at least one week of the year who are directly or indirectly affected by the DC minimum wage increase. Workers are considered to be directly or indirectly affected if their estimated hourly wages (in 2016) are between $5.50 and $13.50 ($2.00 above the 2016 $11.50 minimum wage). The total weighted number of affected workers is 40,934.

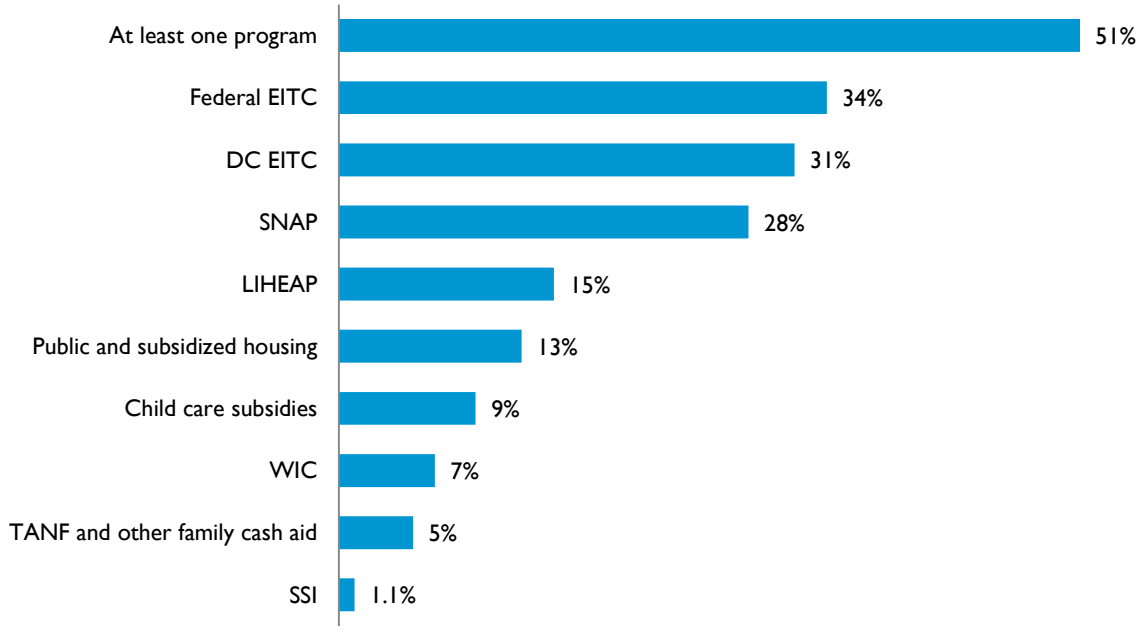
To What Extent Are Affected Workers Served by Public Low-income Assistance Programs?

Just over half (51 percent) of workers affected by the increase in DC's minimum wage currently receive assistance from one or more of the programs shown in figure 1. Higher family income from a minimum wage increase may be offset to some extent by reduced benefits and, in some cases, by loss of eligibility for these programs.

FIGURE 1

Baseline Program Participation

For workers affected by the minimum wage increase



Notes: The figure reflects program participation in working months and does not capture the additional benefits that a worker receives in months unemployed or out of the workforce. The percentages are calculated by summing months of program participation for affected workers during their working months and dividing this by the total number of their working months. The federal EITC, DC EITC, and LIHEAP are simulated on an annual basis and are treated as received equally throughout the months of the year.

About one-third of workers affected by the DC minimum wage increase (34 percent) receive the EITC, a refundable federal tax credit targeted primarily to low-income working families with children. Although a small EITC is available to taxpayers without resident children, the taxpayer must be between the ages of 25 and 64, and income eligibility limits are low enough that a full-time, minimum-wage worker earns too much to qualify. For married taxpayers, the additional earnings of a spouse may move the couple above the EITC eligibility limit, even if the worker's earnings are low enough to qualify.

DC provides a refundable EITC that is equal to 40 percent of the federal EITC. Somewhat fewer workers affected by the minimum wage increase (31 percent) receive the DC EITC than the federal EITC. Low-income taxpayers in DC have a choice between the DC EITC and DC low-income tax credit, and some of those with the federal EITC benefit by claiming the low-income tax credit.

Among those working in a given month who are affected by the DC minimum wage increase, 28 percent receive SNAP, which is available to low-income individuals and families regardless of whether they have children. Federal law imposes time limits on the number of months that able-bodied adults

without dependent children can receive SNAP if they are not working at least 20 hours per week or meeting the requirements of a work program. However, the time limit is waived in DC and elsewhere because of continuing high unemployment.[7]

DC residents with income up to 200 percent of the federal poverty guidelines can receive SNAP under DC's expanded categorical eligibility rules, allowing most minimum wage workers who live alone or support a family to qualify. However, minimum wage workers with income from a spouse or other family member may have too much income to qualify; there are also restrictions on the eligibility of noncitizens and students enrolled in higher education programs. Further, not all eligible families apply for assistance, and national estimates show that take-up rates are lower for able-bodied adults without children than for families with children (Eslami and Cunnyngham 2014).

Fifteen percent of workers affected by DC's minimum wage increase receive energy assistance through the Low Income Home Energy Assistance Program (LIHEAP) in at least one month of the year, and 13 percent receive rental assistance through public and subsidized housing programs.[8] Less than 10 percent receive assistance from programs for families with children, reflecting the relatively small share of parents among workers affected by the minimum wage increase. Nine percent of affected workers receive subsidized child care, 7 percent receive WIC, and 5 percent receive TANF or other family cash assistance. A small number of affected workers (1 percent) receive Supplemental Security Income (SSI), which provides income to low-income elderly persons and persons with disabilities.

Effect of Minimum Wage Increase on Example Households

The amount of additional income that a family receives as a result of a minimum wage increase depends on a variety of factors, including the worker's hourly wage before the minimum wage increase, the number of hours worked, the family's income level before the minimum wage increase, and the extent to which the family receives assistance from various government programs. Nearly all workers must pay payroll taxes on their earnings. Depending on income level and number of children, a family's income may be supplemented by the EITC or it may pay income taxes on the earnings. For workers with low incomes in the phase-in range for the EITC, additional earnings may increase the amount of EITC, but those with higher incomes in the EITC's phase-out range will lose some or all of their EITC with additional income. Workers receiving assistance from government programs may experience reductions in benefits or loss of eligibility as a result of their additional earnings.

Tables 4, 5, and 6 provide examples of the effect of the minimum wage increase on workers with different characteristics. The examples shown in these tables do not reflect typical cases of those affected by the minimum wage increase—fewer than 1 percent of workers are single parents participating in only SNAP and EITC (and no other program), less than 0.5 percent are single parents participating in the full set of programs, and less than 9 percent are unmarried individuals who participate in SNAP and the EITC (when eligible) and live on their own or share their living quarters with unrelated people. Given the variation in the characteristics and program participation of workers affected by the minimum wage, it is difficult to define a case that is typical. The examples are therefore intended to demonstrate the ways in which increased earnings can interact with taxes and government benefits to affect family income.

For each of these hypothetical households, we consider examples with half-time and full-time workers. We assume the workers are paid $8.25 before the minimum wage increase and $11.50 after. The examples reflect income and benefits in 2016. Program rules are generally assumed to be the same in 2016 as in 2011 after indexation for inflation with the exception of certain rules that maintain their 2011 values.[9] Both before and after the minimum wage change, SNAP benefits are shown without the temporary increase that expired in 2014, and payroll taxes are shown at their current levels rather than at the lower rates that were in effect during the 2011 to 2012 payroll tax holiday.

Unmarried Worker without Children

A half-time minimum wage worker at the current DC minimum wage of $8.25 per hour, under an $11.50 minimum wage, would experience an increase in annual earnings of $3,380 (table 4). These higher earnings reduce the worker's annual SNAP benefits from $2,308 to $1,298 (44 percent), and the worker's federal and DC EITC benefits would fall by more than half (53 percent). The worker also pays an additional $259 in payroll taxes on the increased earnings. The half-time worker is assumed to share an apartment with roommates and to be ineligible for the DC rental property tax credit. The net increase in the worker's income (after benefits and taxes) is $1,463, which is just below half (43 percent) of the increase in earnings.

TABLE 4

Change in Earnings, Benefits, and Taxes for Unmarried Individuals without Children Receiving SNAP and EITC Only

	Works 20 Hours per Week				Works 40 Hours per Week			
	$8.25/ hour	$11.50/ hour	Change	Percent change	$8.25/ hour	$11.50/ hour	Change	Percent change
Annual earnings	$8,580	$11,960	**$3,380**	39	$17,160	$23,920	**$6,760**	39
SNAP	$2,308	$1,298	**-$1,010**	-44	$564	$0	**-$564**	-100
Payroll taxes (worker share)	*$656*	*$915*	***$259***	39	*$1,313*	*$1,830*	***$517***	39
Federal income tax								
Tax before credits	$0	$152	$152	Increase	$672	$1,555	$883	131
Federal EITC	$492	$234	-$259	-53	$0	$0	$0	None
Tax after credits	*-$492*	*-$82*	***$410***	-83	*$672*	*$1,555*	***$883***	131
DC income tax								
Tax before credits	$94	$229	$135	144	$437	$841	$404	93
DC EITC	$197	$93	-$103	-53	$0	$0	$0	None
DC rental property tax credit	$0	$0	$0	None	$434	$0	-$434	-100
Tax after credits	*-$103*	*$136*	***$239***	Increase	*$3*	*$841*	***$838***	Increase
Income after benefits and taxes	$10,827	$12,289	**$1,463**	14	$15,736	$19,694	**$3,958**	25

Source: Authors' calculations based on the TRIM3 microsimulation model.
Notes: The pool of workers considered here reflects less than 9 percent of affected workers. The unmarried person without children is assumed to be at least 25 (and under 65) and, therefore, meets the age requirement for the EITC for taxpayers without children. Excluding utilities, the half-time worker is assumed to pay $352 in rent (the median according to the 2011 SNAP Quality Control Data, as adjusted to 2016 dollars). He is assumed to share his apartment with roommates and to be ineligible for the DC rental property tax credit. Excluding utilities, the full-time worker is assumed to rent an apartment for $703 per month (the median for SNAP households according to the 2009–11 ACS, adjusted to 2016 dollars) and to claim the DC rental property tax credit. Both workers are assigned the SNAP heating and cooling standard utility allowance. Numbers in bold represent the subtotal of changes in all items within an income or tax category demarked by horizontal lines; bold numbers in the bottom line represent the net change in disposable income. Numbers in italics are positive tax liabilities and as such must be subtracted from income.

Repeating the above example for a full-time worker, the new minimum wage increases annual earnings by $6,760. The higher earnings move the worker above the SNAP eligibility limit, resulting in the loss of $564 in annual SNAP benefits. The worker pays payroll and income taxes on the additional earnings, but was already above the earnings limit for the EITC and so does not experience a loss of income from that source. The full-time worker is assumed to rent his own apartment. He qualifies for $434 in DC rental property tax credit under the current minimum wage, but is above the eligibility limit

for the credit under the new minimum wage. The net increase in the worker's income is $3,958, or 59 percent of the increase in earnings.

Single Parent with Two Children Participating in SNAP and EITC

A single parent with two children who works half-time and participates in SNAP and the EITC loses 17 percent of her annual SNAP benefit as a result of her $3,380 additional earnings under the new minimum wage (table 5). However, her EITC increases because her new earnings are low enough to place her in the phase-in range of the credit, where each additional dollar earned makes her eligible for an additional 40 cents of federal EITC and 16 cents of DC EITC. The additional earnings also increase the refundable portion of the child tax credit by $507. The worker is assumed to be sharing a residence with another family and to be ineligible for the DC rental property tax credit. Overall, she experiences a $4,503 increase in income after benefits and taxes, exceeding the increase in her earnings by 33 percent.

TABLE 5

Change in Earnings, Benefits, and Taxes for a Single Parent with Two Children Receiving SNAP and Refundable Tax Credits Only

	Works 20 Hours per Week				Works 40 Hours per Week			
	$8.25/hour	$11.50/hour	Change	Percent change	$8.25/hour	$11.50/hour	Change	Percent change
Annual earnings	$8,580	$11,960	**$3,380**	39	$17,160	$23,920	**$6,760**	39
SNAP	$6,053	$5,044	**-$1,010**	-17	$4,309	$2,004	**-$2,305**	-53
Payroll taxes (worker share)	*$656*	*$915*	***$259***	39	*$1,313*	*$1,830*	***$517***	39
Federal income tax								
Tax before credits	$0	$0	$0	None	$0	$238	$238	Increase
Child tax credit (nonrefundable. portion)	$0	$0	$0	None	$0	$238	$238	Increase
Child tax credit (refundable portion)	$837	$1,344	$507	61	$2,000	$1,762	-$238	-12
Federal EITC	$3,432	$4,784	$1,352	39	$5,618	$4,444	-$1,175	-21
Tax after credits	*-$4,269*	*-$6,128*	***-$1,859***	44	*-$7,618*	*-$6,206*	***$1,412***	-19
DC income tax								
Tax before credits	$0	$8	$8	Increase	$216	$510	$294	136
DC EITC	$1,373	$1,914	$541	39	$2,247	$1,777	-$470	-21
DC rental property Tax Credit	$0	$0	$0	None	$434	$0	-$434	-100
Tax after credits	*-$1,373*	*-$1,906*	***-$533***	39	*-$2,465*	*-$1,268*	***$1,198***	-49
Income after benefits and taxes	$19,619	$24,122	**$4,503**	23	$30,240	$31,568	**$1,328**	4

Source: Source: Authors' calculations based on the TRIM3 microsimulation model.
Notes: The pool of workers here reflects less than 1 percent of affected workers. The single mother is assumed to have children old enough that she does not require child care, or to have a relative who cares for the children for free. She participates in SNAP and receives refundable tax credits. Excluding utilities, the half-time worker is assumed to pay $352 in rent (the median according to the 2011 SNAP Quality Control Data, as adjusted to 2016 dollars). She is assumed to share her apartment with another family and to be ineligible for the DC rental property tax credit. Excluding utilities, the full-time worker is assumed to rent an apartment for $703 per month (the median for SNAP households according to the 2009–11 ACS, adjusted to 2016 dollars) and to claim the DC rental property tax credit. Both families are assigned the SNAP heating and cooling standard utility allowance. Numbers in bold represent the subtotal of changes in all items within an income or tax category demarked by horizontal lines; bold numbers in the bottom line represent the net change in disposable income. Numbers in italics are positive tax liabilities and as such must be subtracted from income.

If the single parent with two children works full-time at the minimum wage, then she experiences a $6,760 increase in earnings under the new minimum wage. With her new earnings, she loses 17 percent of her SNAP benefits and she moves into the phaseout range of the EITC, where each additional dollar earned reduces the EITC by 21 cents. Her federal EITC, then, falls by $1,175 and her DC EITC falls by $470. She already receives the full refundable child tax credit. Her additional earnings mean that some of the credit now goes to reducing her tax liability before credits, but the overall amount of her child tax credit is unchanged. The full-time worker is assumed to rent her own apartment. She qualifies for $434 in DC rental property tax credit under the current minimum wage, but is above the eligibility limit for the credit under the new minimum wage. Overall, the single parent experiences a $1,328 increase in income after benefits and taxes, which is about 20 percent of the increase in earnings.

Single Parent with Two Children Participating in Multiple Programs

Table 6 provides an example of a single parent with two children who participates in TANF, public and subsidized housing, SNAP, LIHEAP, and WIC and receives subsidized child care. The tax results are similar to the example in table 5, except for a slightly larger refund under some scenarios from federal and DC child care credits.[10] Because of the amount of housing subsidy received, the single parent is not eligible for the DC rental property tax credit. Therefore, the full-time worker receives a smaller DC tax refund than in the previous example.

If the single parent works half-time, she loses $958 in TANF and $675 in housing subsidies (through higher rent payments) as a result of the new minimum wage. At the current minimum wage, she receives fully subsidized child care, but, under the new minimum wage, she must pay $171 per year in monthly copayments. Because of TANF income and lower rent paid for subsidized housing, SNAP benefits are lower than in the example in table 5. However, the loss in SNAP benefits ($506) is also lower than the table 5 example because the reduction to the SNAP benefit from higher earnings is offset, to some extent, by the reduction in the TANF benefit, a higher rent payment required for subsidized housing, and the child care copayment (all of which would lead to a higher SNAP benefit if earnings were held constant). The single parent maintains eligibility for LIHEAP and WIC, where benefits do not vary with income as long as eligibility is maintained. Overall, she experiences a $3,211 increase in her income after benefits, taxes, and child care expenses, which is only slightly less than the increase in her earnings.

If the single parent works full-time, she is ineligible for TANF under the current minimum wage. However, her additional $6,760 in earnings decreases her housing subsidy by $1,762 and her child care copayment increases by $887. Her SNAP benefits are reduced by 41 percent, a smaller loss than if she were not facing higher rental payments and child care expenses. As with the half-time worker, LIHEAP and WIC benefits are unaffected by the minimum wage increase. The combination of benefit reductions, EITC reductions, and payroll taxes, cause the single parent's income after benefits, taxes, and child care expenses to increase just $227, or 3 percent of the increase in her annual earnings.

TABLE 6

Change in Earnings, Benefits, and Taxes for a Single Mother with Two Children Participating in All Programs where Eligible

	Works 20 hours per week				Works 40 hours per week			
	$8.25/ hour	$11.50/ hour	Change	Percent change	$8.25/ hour	$11.50/ hour	Change	Percent change
Annual Earnings	$8,580	$11,960	**$3,380**	39	$17,160	$23,920	**$6,760**	39
TANF	$1,884	$926	**-$958**	-51	$0	$0	**$0**	None
Public or subsidized housing	$16,446	$15,770	**-$675**	-4	$14,685	$12,923	**-$1,762**	-12
Child care copayment	*$0*	*$171*	***$171***	Increase	*$828*	*$1,715*	***$887***	107
SNAP	$4,993	$4,487	**-$506**	-10	$3,653	$2,147	**-$1,506**	-41
LIHEAP	$684	$684	**$0**	0	$684	$684	**$0**	0
WIC	$556	$556	**$0**	0	$556	$556	**$0**	0
Payroll taxes (worker share)	*$656*	*$915*	***$259***	39	*$1,313*	*$1,830*	***$517***	39
Federal income tax								
Tax before credits	$0	$0	$0	None	$0	$238	$238	100
Child care credit	$0	$0	$0	None	$0	$238	$238	100
Child tax credit (nonrefundable portion)	$0	$0	$0	None	$0	$0	$0	None
Child tax credit (refundable portion)	$837	$1,344	$507	61	$2,000	$2,000	$0	0
Federal EITC	$3,432	$4,784	$1,352	39	$5,618	$4,444	-$1,175	-21
Tax after credits	*-$4,269*	*-$6,128*	***-$1,859***	44	*-$7,618*	*-$6,444*	***$1,175***	-15
DC income tax								
Tax before credits	$0	$8	$8	Increase	$216	$510	$294	136
Child care credit	$0	$8	$8	Increase	$87	$165	$77	Increase
DC EITC	$1,373	$1,914	$541	39	$2,247	$1,777	-$470	-21
Tax after credits	*-$1,373*	*-$1,914*	***-$541***	39	*-$2,119*	*-$1,432*	***$686***	-32
Income after benefits, taxes, and child care expenses	$38,129	$41,339	**$3,211**	8	$44,335	$44,562	**$227**	0.5

Source: Authors' calculations based on the TRIM3 microsimulation model.
Notes: The pool of workers here reflects less than 1 percent of affected workers. The single mother is assumed to have two children, ages 1 and 7. She receives subsidized child care and makes a copayment (if earnings are enough to require a copayment). She participates in all programs shown for which she is eligible. WIC reflects the benefits for her youngest child. Her SNAP excess shelter expense deduction is calculated using her rental contribution (as required for public and subsidized housing) and the DC SNAP heating and cooling standard utility allowance. Numbers in bold represent the subtotal of changes in all items within an income or tax category demarked by horizontal lines; bold numbers in the bottom line represent the net change in disposable income. Numbers in italics are positive tax liabilities and as such must be subtracted from income.

Simulated Effect of Raising the Minimum Wage

Studies of the relationship between the minimum wage and overall employment of workers paid below the new minimum wage tend to find a small negative relationship concentrated among younger workers (see the literature review). Using aggregate data, estimates of net job loss depend on the number of workers earning less than the new minimum wage and the assumed minimum wage response—the greater the assumed response, the greater the estimated net job loss. We estimate that there are about 41,000 low-wage workers who both live and work in DC, but only about 28,000 would have earned less than

$11.50 an hour in 2016 without the new minimum wage. If we assume that overall employment of those workers falls by 1 percent for every 10 percent rise in the minimum wage, then the 39 percent increase in the minimum wage would be associated with a drop in employment of almost 1,100. If the effect is confined to the 6,350 workers under age 25 who would have earned less than $11.50 an hour without the new minimum wage, the drop in employment would be closer to 250. Competing assumptions about the size of the aggregate minimum wage effect can lead to higher and lower estimates of net job loss.

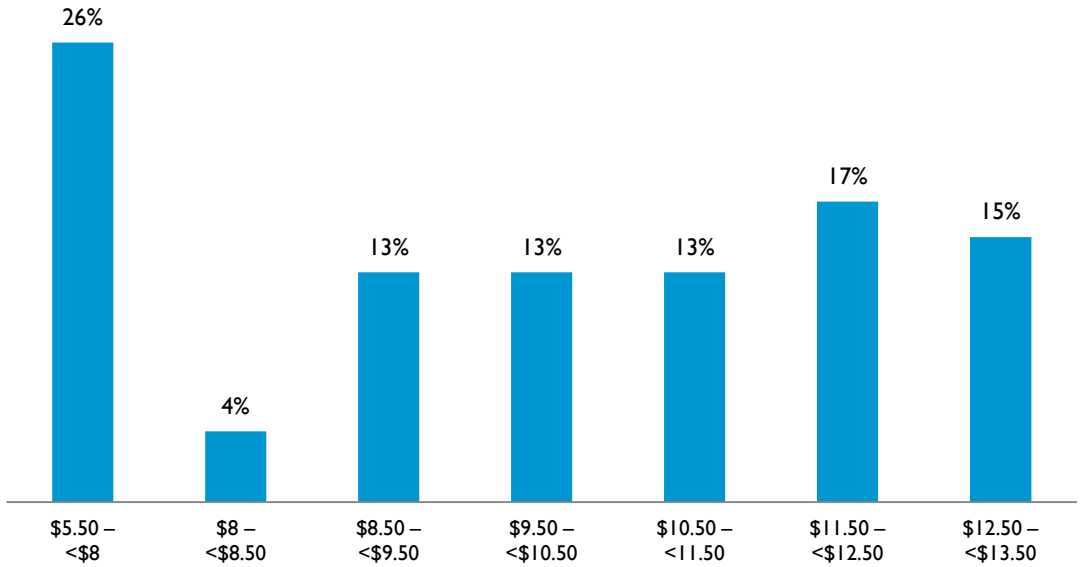
For this study, we are using microsimulation modeling to anticipate the effects of the higher minimum wage on DC's low-wage workers and their families. Consequently, we have to consider how an individual worker's employment may respond to the rise in that worker's wages. As noted in the data and methods section, we consider three types of responses: no response, a 1 percent decrease in the probability of employment for every 10 percent rise in wages for young workers below the new minimum wage, and a 1 percent decrease in the probability of employment for every 10 percent rise in wages for all workers below the new minimum wage (our higher job loss scenario).[11] At the individual level, just as at the aggregate level, the greater the assumed response to wage changes, the greater the simulated employment effects.

Wage distribution, more so than any assumptions about potential job losses due to rising labor costs, influence the simulated effects of raising the minimum wage to $11.50 an hour in 2016 on employment, earnings, and incomes of low-wage workers who live and work in DC. Even though raising the minimum wage from $8.25 an hour to $11.50 an hour represents an almost 40 percent increase in the wage rate, a substantial portion of DC's low-wage workers (45 percent) are projected to earn more than $10.50 an hour in 2016 in the absence of a minimum wage increase (figure 2). Even with spillover effects bumping the wages of workers above the new minimum, the rise in wage rates is closer to about 10 percent for these workers. Smaller changes in wage rates are associated with smaller changes in employment, earnings, and incomes.

FIGURE 2

Distribution of Workers Affected by the Minimum Wage Increase

By hourly earnings, in 2016 dollars



Because the actual change in hourly wage rates we anticipate is small relative to the nominal increase in the minimum wage, we expect job loss among workers whose wages are affected by the minimum wage to be modest. For example, in our high job-loss scenario, in which we anticipate a 1 percent decline in

employment for every 10 percent increase in wage rates, we find that about 1.2 percent of DC's 41,000 low-wage workers would lose their jobs as a result of the rising minimum wage. If we assume job losses are confined to those age 24 and younger, we simulate job losses for about 0.3 percent of DC's low-wage workers.[12]

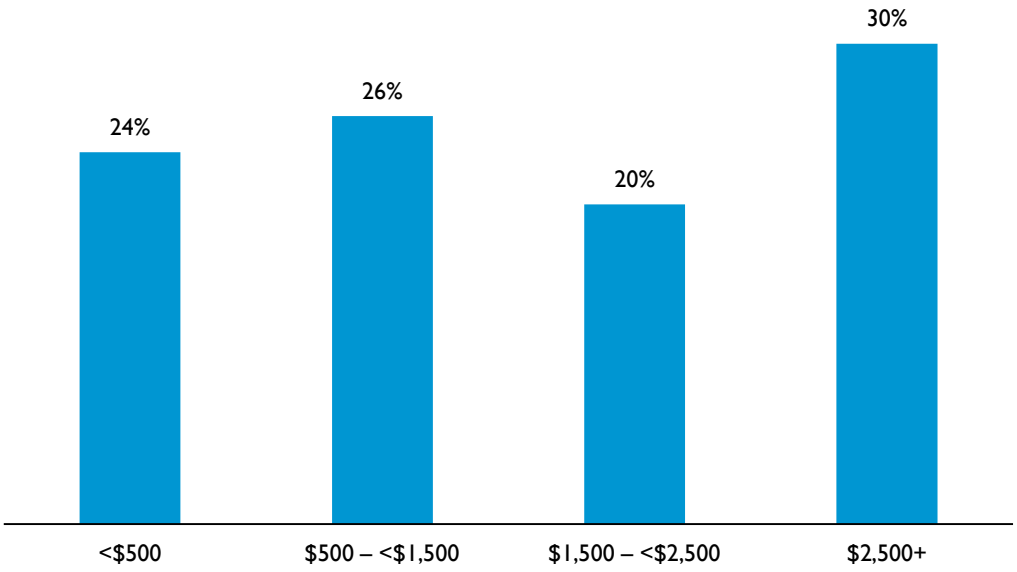
To assess the effects of raising the minimum wage on DC's low-wage workers and their families, we examine simulated earnings and income at the family level and present results that reflect not just the workers, but also the families living with low-wage workers. We do this because transfer programs and net tax liabilities accrue at the family level, and workers share their earnings with their families. Further, this allows us to capture how the dependents of low-wage workers are affected by changes in the minimum wage.[13]

If all affected workers keep their jobs pursuant to increasing the minimum wage to $11.50 an hour, half the workers and their family members would see their earnings rise by more than $1,500 a year (figure 3). About one-quarter would see their earnings rise by less than $500 a year. The disposable family incomes of affected workers—the amount of money they have available to spend on goods and services after taxes, tax credits, and public assistance benefits—on average, would rise by somewhat less than the family's earnings (figure 4). Just under one-third would see their disposable incomes rise by more than $1,500, about one-third would experience a rise of between $500 and $1,500, and another third would gain less than $500. Only 3 percent would see their incomes decline because they would lose more in transfer benefits and tax credits than they would gain in earnings. Although some of the increase in earnings will be offset by reductions in government benefits and tax credits, more nearly 80 percent of the affected workers will keep at least half of their earnings gains (figure 5). Six percent would see their incomes increase by more than their increase in earnings, likely because they are in the phase-in range of the EITC, offsetting any losses from other assistance programs.

FIGURE 3

Change in Annual Earnings

For persons in families with workers affected by the minimum wage increase



Note: The figure is based on the no-employment-change scenario.

FIGURE 4

Change in Annual Income

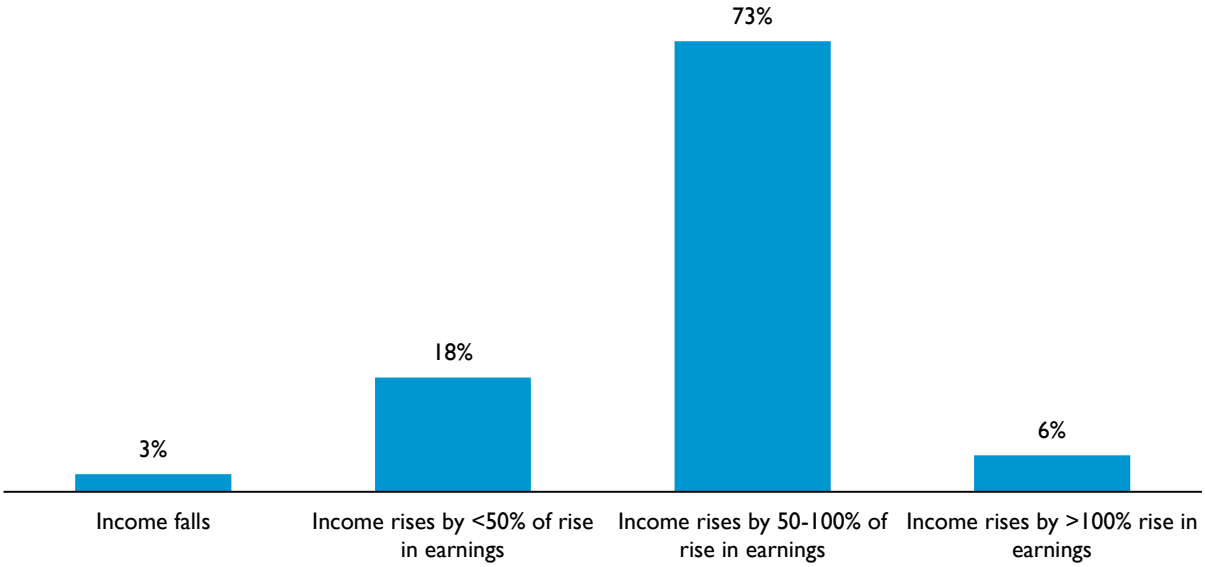
For persons in families with workers affected by the minimum wage increase

Note: The figure is based on the no-employment-change scenario.

FIGURE 5

Change in Income Relative to Earnings

For persons in families with workers affected by the minimum wage increase



Note: The figure is based on the no-employment-change scenario.

Because anticipated job losses are limited under the scenarios we consider, our results for earnings and income do not vary much across the three scenarios. Even under scenarios in which employment falls by 1 percent for every 10 percent rise in wages, about 50 percent of affected workers and their families would still experience annual earnings gains of more than $1,500, and nearly 80 percent would keep at least half of their earnings gains. Only 1 percent would experience declines in earnings, and 3 percent

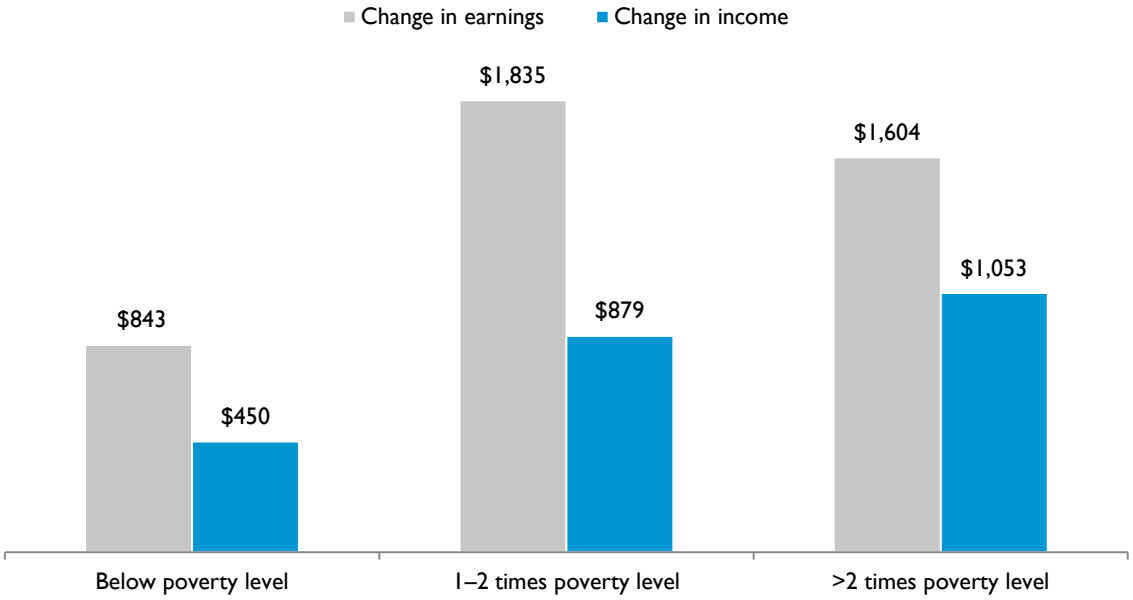
would experience declines in income. Findings on earnings and income changes, when job loss is confined to younger workers, fall in between the no-job-loss and high-end job-loss scenarios.

Near-poor families and families with incomes in excess of twice the poverty level would experience greater earnings and income gains from the higher minimum wage than workers in poor families (figure 6). Affected workers living in families with incomes below the federal poverty line would experience a median rise in earnings of about $840 a year and a rise in median incomes of about $450 a year. Those in near-poor families would experience median earnings increases of $1,835 and median income increases of about $880. Those living in families with incomes above twice the poverty level would, on average, experience increases in earnings of about $1,600 and increases in incomes of about $1,050. The median changes in earnings and incomes by income class do not vary across the three employment scenarios we consider.

FIGURE 6

Median Change in Earnings and Income

For persons in families with workers affected by the minimum wage increase, by family income relative to need



Note: The figure is based on the no-employment-change scenario.

Differences in earnings and income changes by family income reflect preexisting differences in hours worked and wage rates. Workers in poor families, by definition, have to be working limited hours at very low-wage rates. Nearly two thirds of poor workers affected by the minimum wage work less than 1,000 hours in the year, compared with 13 percent of the near poor and 18 percent of those in higher-income families. Thus, any given wage increase is multiplied by fewer hours, yielding a smaller increase in earnings (wages x hours) than for those working full-time and full-year. Further, because workers in poor families tend to have computed wage rates below the current minimum wage, their hourly wages grow by less than the statutory minimum wage increase.[14] Finally, because poor families are more likely to be eligible for and participate in public assistance programs than higher-income families, their earnings gains are more likely to be offset through the loss of public assistance benefits.

The earnings gains for near-poor and higher-income families are similar to the near poor in that they benefit slightly more than those with higher incomes, but those in higher-income families experience greater income gains. The earnings difference likely occurs because near-poor, low-wage workers are more likely to be the primary source of income for their families, while nonpoor, low-wage workers are

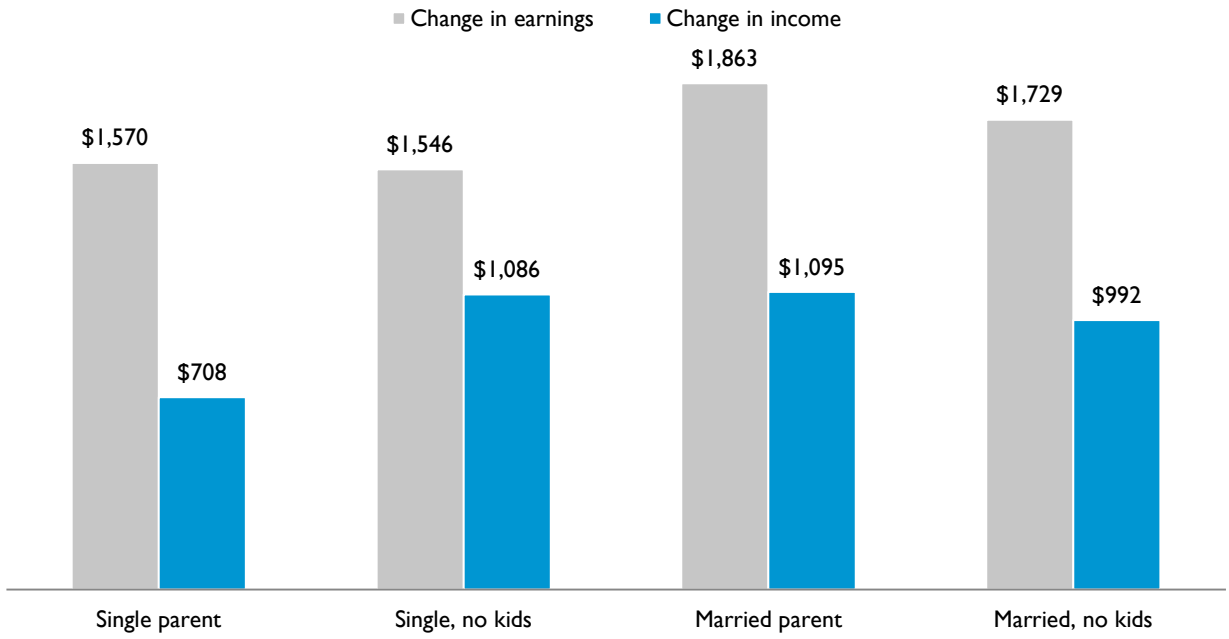
more likely to be secondary earners working fewer hours during the year.[15] The higher-income group also includes a higher share of workers earning above the new minimum wage, who receive a small increase in their wages through spillover effects.[16] Higher-income families are the least likely to receive government benefits and refundable tax credits, so they tend to experience the biggest net-income gains from raising the minimum wage.

On average, married couples enjoy greater earnings gains from the higher minimum wage than single individuals, and single parents experience lower increases in income gains than workers in other types of families (figure 7). The median simulated increase in family earnings for married parents is $1,863 as compared with $1,729 for married workers without kids, $1,570 for single parents, and $1,546 for singles without children, when we assume no employment loss. Median earnings are largely unaffected by the job-loss assumptions for all groups except married couples without children, whose median earnings are simulated to rise by $1,646 if some workers were to lose their jobs following the minimum wage increase. Single parents keep only about $700 of their $1,570 earnings increase, because they are more likely than other workers to be drawing public assistance benefits. Single workers without children and married workers with children experience disposable income increases of nearly $1,100 under the no-job-loss scenario; under the higher job-loss scenario, these two groups still keep more than 50 cents on every dollar of increased earnings, but their median disposable-income change is reduced to $1,044 for single parents and $1,000 for married parents. Married workers with no children, under the no-job-loss scenario, keep, on average, $992 dollars out of their $1,729 earnings increase; under the higher job-loss scenario, they keep $897 of their $1,646 increase in earnings.

FIGURE 7

Median Change in Family Earnings and Income

Among workers affected by the minimum wage increase, by marital and parental status



Note: The figure is based on the no-employment-change scenario.

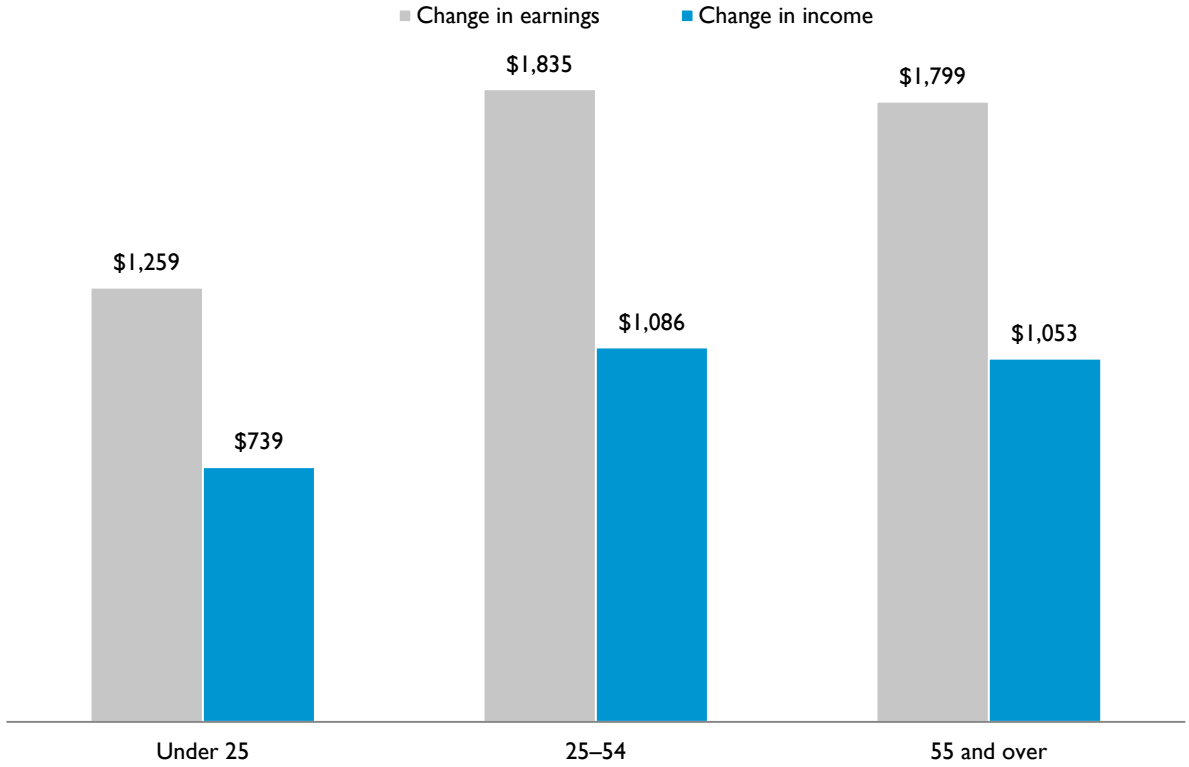
Prime age and older workers affected by the minimum wage, on average, will experience greater earnings and income gains from the new minimum wage than workers under age 25 (figure 8). Under the no-job-loss scenario, workers age 25 and older would experience, on average, a $1,800 rise in family earnings, and their disposable incomes would rise by over $1,000. Workers under age 25 would experience a median rise in family earnings of $1,259 and a disposable income rise of $739. Median

changes in earnings and income are slightly lower under the higher job-loss scenario than under the no-job-loss scenario, but those differences do not affect cross-age group comparisons.

FIGURE 8

Median Change in Family Earnings and Income

Among workers affected by the minimum wage increase, by age



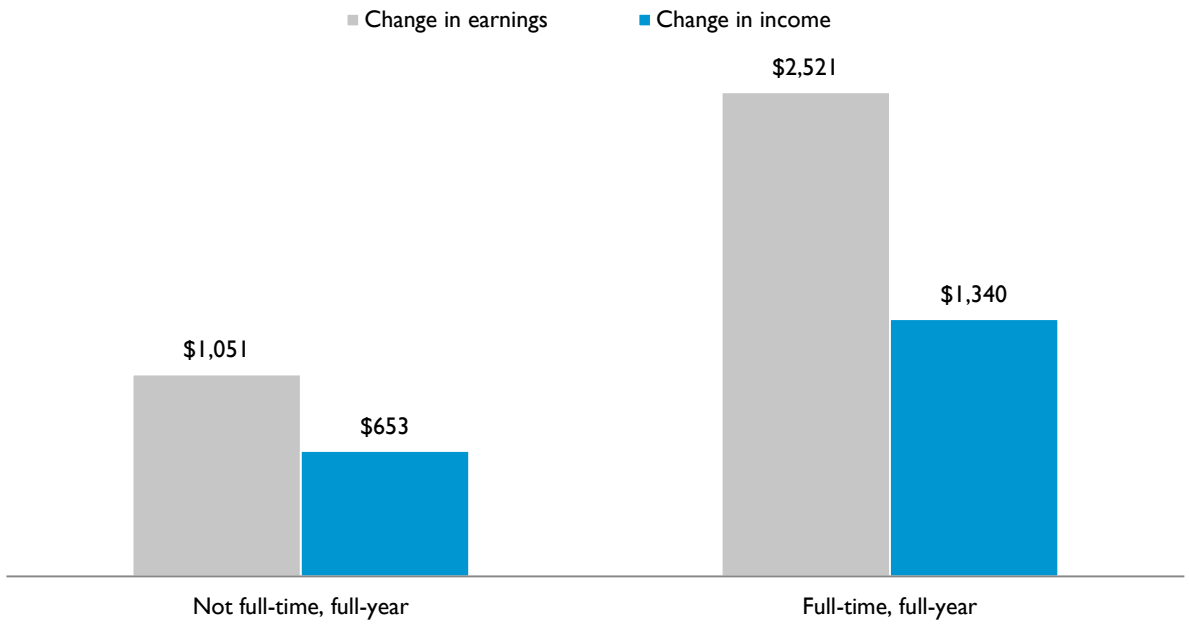
Note: The figure is based on the no-employment-change scenario.

Full-time, full-year workers (referred to as "full-time") benefit more from the minimum wage increase than those working fewer hours, but those working fewer hours keep a higher proportion of their increased earnings (figure 9). Under the no-job-loss scenario, affected workers working less than full-time, on average, see their family earnings rise by $1,051 and their family incomes rise by $653 (keeping over 60 percent of their increased earnings), while full-time workers see their family earnings rise by $2,521 (more than double the rise of non–full-time workers) and their family incomes rise by $1,340 (keeping just over half of their increased earnings). Under the higher job-loss scenario, non–full-time workers would, on average, see their family earnings and incomes rise by $958 and $614, respectively, while full-time workers would see their family earnings and incomes rise by $2,413 and $1,323, respectively.

FIGURE 9

Median Change in Family Earnings and Income

Among workers affected by the minimum wage increase, by full-time and full-year worker status



Note: The figure is based on the no-employment-change scenario.

Program Effects

Increased income from the new minimum wage would lead to slight reductions in program caseloads and benefits. Figure 10 shows the simulated effects under the no-job-loss scenario.[17] Except where noted, the results do not vary noticeably across the three scenarios considered. This is because workers losing jobs are only a small fraction of the over 40,000 workers with increased wages, and even some workers who are simulated to lose their jobs would not necessarily be eligible for assistance from government programs. Income from family members and other sources may keep income above program eligibility limits, even after job loss, workers without children are ineligible for family cash assistance and WIC, and SSI requires that the recipient be at least 65 or disabled.[18]

Benefit Programs

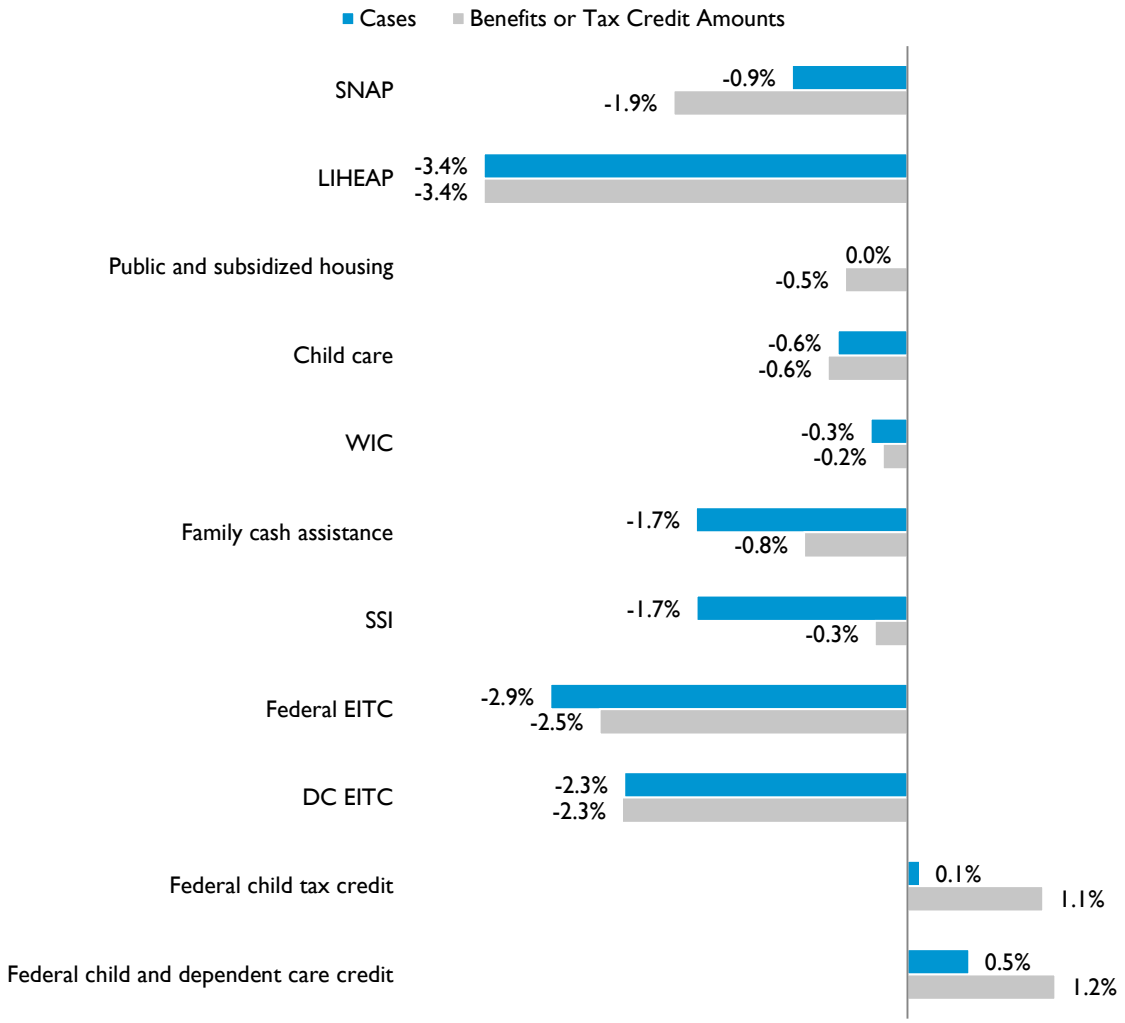
The program most affected by the higher minimum wage, LIHEAP, has a simulated 3.4 percent reduction in caseload and benefits. Family cash assistance (TANF and other family cash aid), SNAP, and SSI are the next most affected programs. The number of cases receiving family cash assistance falls by 1.7 percent, and there is a 0.8 percent reduction in annual benefits. The higher minimum wage would result in a 0.9 percent reduction in the SNAP caseload and a 1.9 percent reduction in SNAP benefits. The number of noninstitutionalized adults receiving SSI falls by 1.7 percent, and annual SSI benefits fall by 0.3 percent.

Public and subsidized housing, subsidized child care, and WIC are the programs least affected by the minimum wage increase. There is virtually no loss of eligibility for public or subsidized housing because households that receive assistance usually have incomes well below the program's income eligibility limits. However, workers would be required to pay more rent as a result of their higher incomes, leading to a 0.5 percent decrease in the annual value of housing subsidies. The number of families receiving child care subsidies and the dollar amount of annual subsidies falls by 0.6 percent, assuming no job losses. Under the high job-loss scenario, there would be a 1.1 percent reduction in the number of families with subsidies and a 1.2 percent reduction in total annual subsidies, because workers who lose their jobs are no

longer eligible for subsidized child care. The number of infants and children receiving WIC falls by 0.3 percent, and the annual value of WIC benefits falls by 0.2 percent.

FIGURE 10

Percent Change in Program Caseloads, Benefits, and Tax Credits for DC Residents



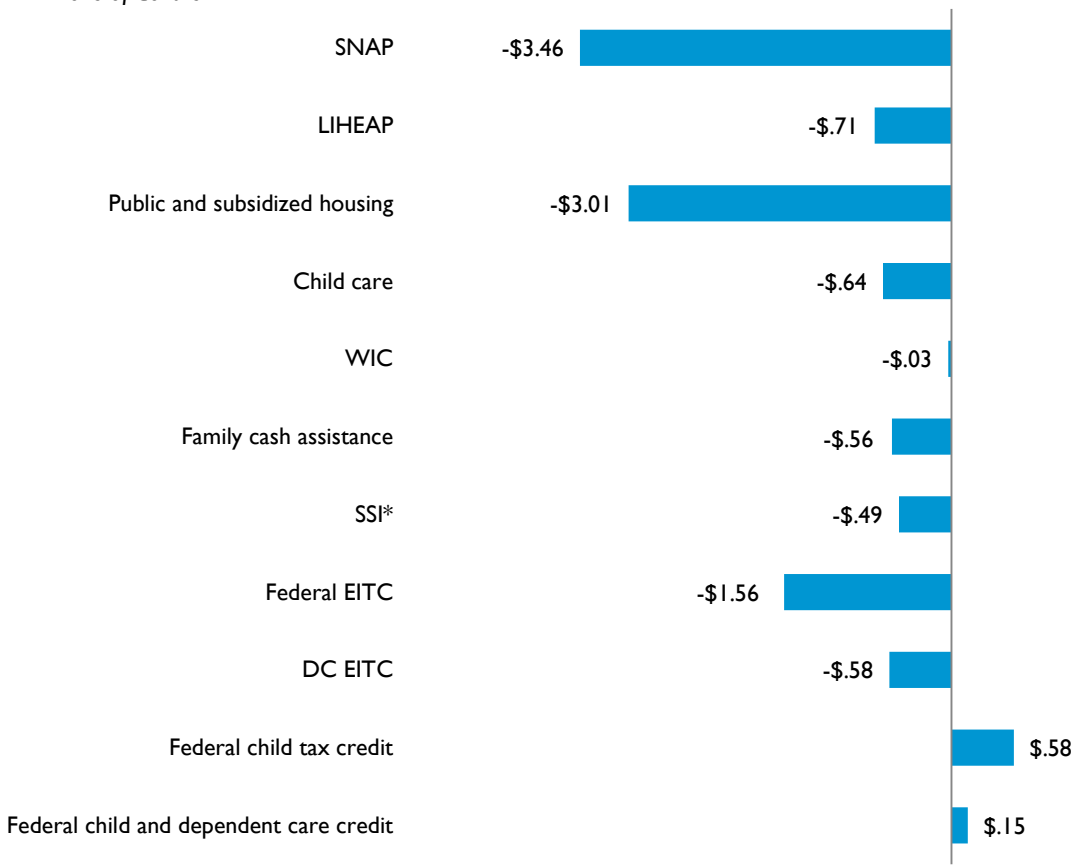
Notes: SSI results reflect the percentage decrease in the adult noninstitutionalized caseload and the percentage reduction in SSI benefits for noninstitutionalized adults and children. Programs are listed in descending order based on the level of affected-worker participation. Transfer programs appear before taxes.

Although LIHEAP has the largest percentage change in caseload and benefits, it is a smaller program than SNAP and public and subsidized housing and, thus, experiences a smaller overall reduction in program benefits (figure 11). Total LIHEAP benefits are estimated to fall by about $710,000 under the minimum wage increase, compared with $3.46 million for SNAP and $3.01 million for public and subsidized housing. Child care subsidies, family cash assistance, and SSI are estimated to experience reductions of around half a million dollars, and the dollar reduction in WIC is about $30,000.

FIGURE 11

Change in Program Benefits and Tax Credits for DC Residents

In millions of dollars



Notes: SSI results reflect the reduction in SSI benefits for noninstitutionalized adults and children. Programs are listed in descending order based on the level of affected-worker participation. Transfer programs appear before taxes.

Under the high job-loss scenario, there would be a 3.4 percent increase in the number of people receiving unemployment compensation during the year, and a 3.8 percent ($2.1 million) increase in annual unemployment compensation benefits. If job loss occurs only among youth, the number of recipients would increase by 1 percent and annual benefits would rise by 0.8 percent ($470,000).

Program savings in the family cash assistance and child care subsidy programs could be used to provide services or benefits to additional families or to reduce DC's own contribution to these programs. SNAP, SSI, and WIC are federally funded entitlements, so savings in these programs would accrue to the federal government. LIHEAP is a federal block grant; program savings here could be used to extend additional assistance to families that remain eligible. The reduction in housing subsidies might initially benefit the DC housing authority, but would ultimately be passed on to the federal government.[19]

Tax Credits

Additional earnings from the higher minimum wage would move some families above the income limit for the federal EITC, resulting in a 2.9 percent reduction in the number of taxpayers claiming the credit. Although families in the phase-in range of the credit would likely see their EITC increase under the new minimum wage, higher incomes would reduce the amount of credit families receive in the phaseout range, yielding a net 2.5 percent ($1.56 million) reduction in EITC benefits. Workers who lose their jobs and do

not have a spouse with earned income become ineligible for the EITC. Thus, we find a slightly larger reduction in the EITC under the higher job-loss scenario—the number of taxpayers claiming the credit would fall by 3.3 percent and total benefits would fall by 2.8 percent ($1.8 million).

Some families with low earnings become eligible for the federal child tax credit under the new minimum wage, and others become eligible for a larger benefit.[20] Few, if any, lose eligibility, as the credit does not begin to phase out until income reaches $75,000 ($110,000 for a married couple). The simulated results show an increase of 0.1 percent in the number of returns claiming the credit, and a 1.1 percent ($580,000) increase in the total amount of the credit. Under the higher job-loss scenario, there is a 0.1 percent reduction in taxpayers claiming the credit and a 0.9 percent ($480,000) increase in the total amount of the credit.

Receipt of the child and dependent care credit also increases with a higher minimum wage. The child care credit is nonrefundable, and so tax units must have positive tax liability before credits to receive the credit. The simulated number of taxpayers with the child and dependent care credit increases by 0.5 percent and the total amount of the credit increases by 1.2 percent ($150,000) under the new minimum wage. The effects are somewhat lower in the higher job-loss scenario, with increases of 0.2 percent and 0.9 percent ($110,000) respectively, because the simulation assumes that taxpayers who lose their jobs will no longer have qualifying child care expenses.

The number of taxpayers claiming DC's EITC would fall slightly under the higher minimum wage, with 2.3 percent reductions in the number of taxpayers with the credit and in total benefits. Under the higher job-loss scenario, the number of taxpayers claiming DC's EITC and the amount of EITC benefits would fall by 2.7 percent. The reductions in DC's EITC are $580,000 and $683,000 under the no-job-loss and higher job-loss scenarios, respectively.

Discussion

Our simulations suggest that DC's new minimum wage of $11.50 an hour in 2016 will, on average, result in modest increases in income for most low-wage workers who live and work in DC and small declines in participation and associated costs of most public assistance programs available to DC residents. Under some simulated scenarios, a little over 1 percent of DC's low-wage workers could lose their jobs and be left worse off than before the increase. Our main findings stem largely from the projected distribution of wages in DC in 2016 and the demographic characteristics of low-wage workers and their families. Even though DC's minimum wage will rise by almost 40 percent, from $8.25 to $11.50 an hour, 45 percent of low-wage workers likely to be affected by the increase will experience much smaller wage gains, as they already earn $10.50 an hour or more. Because the anticipated change in hourly wages is modest, its impact on earnings, incomes, and employment is commensurately small. This would be consistent with the experience of San Francisco from 2004 to 2011, a period during which the city had a higher minimum wage than surrounding counties, yet experienced similar job growth as those counties even in low-wage sectors (Reich, Jacobs, and Dietz 2014).

Proponents of a higher minimum wage see it as a way to improve the well-being of the poor, while critics argue that it is not well-targeted and may even harm the people it aims to help. For DC, in 2016, our simulations suggest that, while the benefits are not sharply targeted toward poor DC residents, many of DC's low-income working households will enjoy modest benefits from the higher minimum wage and few will suffer losses in earnings or income. The targeting concern has two dimensions in DC: (1) low-wage workers are not necessarily poor and (2) low-wage workers are not necessarily DC residents. Over half of the individuals working in low-wage jobs in DC live outside of the city. At the same time, about 20 percent of DC residents who work in low-wage jobs work outside of the city. Thus, the higher minimum wage in DC will affect many nonresidents and will miss some DC residents. Several factors mitigate this issue. Because Montgomery and Prince George's counties in Maryland are also raising their minimum

wages, DC residents working in those counties will see their wages rise if they continue working. (Further, higher wages in Maryland and DC may force Virginia employers to raise their wages to compete for workers.) In addition, low-wage workers who commute into DC may contribute more to city revenue through sales and parking taxes if they spend their additional income on goods purchased in DC.

Regarding their incomes, 19 percent of low-wage workers who live and work in DC are poor, but another 35 percent are near poor with incomes between one and two times the poverty level. Hence, over half of the workers affected by the new minimum wage are in low-income families. For most families, higher earnings mean higher taxes and reductions in public assistance benefits; as such, net income increases by less than earnings. For families with low-wage workers, we project average annual net income gains of $450 for poor families, $879 for near-poor families, and $1,053 for families with incomes over twice the poverty level. Our upper bound estimates for job loss among low-wage workers indicate that less than 1 percent of low-wage workers in poor families would lose their jobs compared with about 2.4 percent of workers in near-poor families.

Although our simulations focus on the potential implications of raising DC's minimum wage on affected workers' earnings, incomes, and employment and on DC's public assistance caseloads and expenditures, the effects of a higher minimum wage may manifest themselves in ways not captured by our analysis. For example, some research that we reviewed suggests that higher wages can reduce worker turnover and raise productivity, leading to economic growth and higher employment levels. We do not explicitly model such effects, but our scenarios in which there is no employment displacement can be viewed as implicitly assuming that higher labor costs from the minimum wage are perfectly offset by higher productivity.

Higher wage costs may also be directly borne by business owners and highly compensated employees through lower profits and incomes, which could reduce tax revenue for DC, but is beyond the scope of our analysis. Alternatively, employers could pass the cost of the minimum wage increase on to consumers through higher prices. For example, researchers find that San Francisco's higher minimum wage led to a 2.8 percent increase in the cost of restaurant meals (Reich, Jacobs, and Dietz 2014). For DC, any price effects are likely to be diffuse as purchasers of DC's good services include not only DC residents but also those in nearby jurisdictions as well as tourists from around the country and the world. Nevertheless, our simulations do not explore price effects.

Employers may choose to reduce noncash compensation in response to higher-wage bills. Although few low-wage jobs provide health insurance, employers that do may pass through more of the costs to workers or even discontinue the benefit. However, because of the Affordable Care Act, affected families can obtain health insurance through Medicaid or receive subsidized insurance through the health exchange. Employers could also reduce costs by reducing paid time off and paid holidays or through reductions in pension contributions. Again, this is not captured in our analysis.

Finally, businesses may decide to relocate from DC. Given that much of DC's low-wage employment is in the service and hospitality sectors, employers are unlikely to want to leave the greater DC area. Within the greater DC area, employers will face the same minimum wage in Maryland's surrounding counties as in DC, so there would be no wage advantage to moving there. Some may move to Virginia, but market wages in the nearby Virginia counties may be pushed up in response to the higher minimum wages in Maryland and DC. We cannot model business relocation, but we do expect that it would be rare.

Simulation exercises like the ones in this report are useful for understanding the potential implications of future policies, but they depend on the quality of the underlying data and the assumptions required to generate results. We do not know how DC's employers will respond to a higher minimum wage. After reviewing the literature, we opted to examine three potential scenarios with respect to how employment would respond to higher wages. (The most pessimistic scenario involved a reduction of employment of 1 percent for every 10 percent increase in wages.) But that literature cannot speak directly to the idiosyncrasies of DC's labor market. Employment in DC may be even more sensitive to wages than

we assume in our pessimistic scenario. Nevertheless, given the wage distribution in DC, even if job loss were twice as high as our high-end estimate, fewer than 1,000 workers would be displaced.

Similarly, our profile of DC's low-wage workers is only as good as the underlying data in the ACS and the adjustments to program participation made through the TRIM3 model, which in turn, depend on the quality of program participation data from DC and federal sources. The ACS is the best available data for DC's population and the TRIM3 model has been thoroughly vetted and widely respected for its applicability to national and state-specific analyses.

How we implement wage increases due to a higher minimum wage also influences our results. For example, we assume there will be spillover effects pushing some people's wages above the new minimum. If we overestimate these spillover effects, then we overstate both earnings gains and job loss. Similarly, for workers with computed wage rates that fall below the current minimum wage, we assign a wage gain that is proportional to the starting wage under the assumption that those with the lowest computed wages are the most likely to not be covered by minimum wage legislation. To the extent that we underestimate wage gains for those workers, we would understate earnings gains and job loss. Again, however, these are techniques we have used in other analyses.

With all these caveats in mind, our simulation results are best understood as a guide for anticipating the consequences of DC new $11.50 an hour minimum wage, rather than as a set of specific predictions.

Notes

1. TRIM3 is a comprehensive microsimulation model developed and maintained at the Urban Institute. The CPS-based version of TRIM3 is funded primarily by the Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. The adaptation of TRIM3 methods to the ACS data was funded by the Casey Foundation and the MacArthur Foundation.
2. For tipped workers, employers are expected to ensure that the value of tips and wages combined are at least equal to the minimum wage.
3. National Conference of State Legislatures, "State Minimum Wages: 2014 Minimum Wage by State," June 26, 2014, accessed June 27, 2014, http://www.ncsl.org/research/labor-and-employment/state-minimum-wage-chart.aspx.
4. We use the Integrated Public Use Microdata Series (IPUMS) version of the ACS (Steven Ruggles, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek, Integrated Public Use Microdata Series: Version 5.0 [Machine-readable database], Minneapolis: University of Minnesota, 2010). The 2009–11 IPUMS ACS data were the most recently available at the time the simulations were performed. In addition, we use the 2012 IPUMS ACS to tabulate the location of residence and work for low wage workers who live or work in DC.
5. Although we do not assign a minimum wage increase to workers who report that their primary job is self-employed unincorporated, it is possible that some workers with apparently low hourly earnings have a mix of self-employed and wage or salary earnings. Tipped workers, whose reported earnings (which are meant to include tips) and hours of work produce hourly earnings in the $5.50 to $13.50 range, are simulated as affected by the minimum wage increase. Employers are meant to ensure that the combination of tips and wages produces hourly earnings of at least the full minimum wage. The simulation, therefore, assumes that tipped workers who currently have earnings at or near the minimum wage will see their wages increase under the new minimum wage along with nontipped workers.
6. The assumption that workers with wages above the new minimum would not experience any disemployment effects even if their wages rise slightly is consistent with the work of CBO (2014) and others, and follows from the idea that, even if employers choose to use fewer less skilled minimum wage workers, they would substitute some more skilled higher wage workers for the tasks that had been done by minimum wage workers, as the more skilled higher wage workers would be sufficiently more productive than the minimum wage workers.
7. Even in the absence of the time-limit waiver, just 6 percent of DC workers affected by the minimum wage increase work fewer than 20 hours per week, so most would not be affected by the SNAP time limit.
8. Programs include those funded by the US Department of Housing and Urban Development (HUD), including public housing, Section 8 certificates and vouchers, Section 8 moderate rehabilitation, Section 8 new construction and substantial rehabilitation, Section 236 projects, and other HUD multifamily assisted projects.
9. We use 2011 rules because they were the most recent rules available within the TRIM3 model at the time of the analysis. Rules not indexed for inflation include the maximum child tax credit, the $3,000 threshold for the refundable portion of the child tax credit, and the child and dependent care credit. The DC TANF and child care subsidy programs are not indexed for inflation, and so the example assumes that the rules of these programs remain at their 2011 values. Indexing TANF and child care subsidies for inflation would cause little change to the results shown in table 6—the family's income change as a percentage of the change in earnings would remain at 95 percent for the 20 hour per week worker and 3 percent for the 40 hour per week worker.
10. The child care credit is nonrefundable. However, if the family has tax liability before credits, the child care credit reduces taxes to zero before subtraction of the refundable credits.
11. The responsiveness of an individual's employment to a wage change does not correspond directly to aggregate estimates of the employment response to a change in the minimum wage. The aggregate responsiveness reflects the effects of employment changes for all workers earning between the old and new minimum wage. As there is a distribution of workers between those wages, to achieve any given aggregate response, the average responsiveness across individuals must be somewhat higher. For example, consider an example of raising the minimum wage from $10 to $11 in a world with 2,000 affected workers, 1,000 earning $10 and 1,000 earning $10.48. If the aggregate response to a 10 percent rise in minimum wage is a 1 percent decline in employment, we would expect 20 people to lose their jobs. If we apply that aggregate effect to individuals, however, we would see 10 job losses among those earning $10 an hour and only 5 job losses among those earning $10.48, as their wages would rise by only 5 percent. It is difficult to directly translate estimates of the aggregate employment effects from the minimum wage to the individual level. Empirically, our job loss scenarios correspond to an aggregate

responsiveness of a 0.4 to 0.5 percent reduction in employment for every 10 percent increase in the minimum wage.

12. As noted in the literature review, experts disagree on the size and significance of the employment effects of raising the minimum wage. Our three scenarios fit well within most of the literature. Assuming a stronger relationship between employment and the minimum wage would lead us to anticipate greater job losses, but even doubling our higher job loss scenario would still lead us to find fewer than 1,000 workers losing their jobs pursuant to the rise in minimum wage. Other factors that mitigate against finding greater job losses are the assumption that workers currently paid more than the minimum wage would experience no job losses, even though their wages are pushed up slightly as a result of spillover effects and that those with calculated wages below the current minimum wage do not receive the full minimum wage increase (their wages increase proportionally depending on how close they are to the old minimum wage with those closer to the old minimum wage receiving larger increases and those farther away receiving smaller increases). We are considering only workers who live and work in DC. Any employment effects would also be felt by the many low-wage workers who commute into DC from surrounding jurisdictions.
13. For ease of discussion, we present the results of figures 3 through 9 in terms of "affected workers." However, the figures are weighted by the number of persons in affected workers' families and so reflect the characteristics of persons in families with an affected worker. Figures 7 through 9 present results by the marriage and parent status, age, and full-time full-year work status of the worker affected by the minimum wage increase. In these figures, persons in families with more than one affected worker are represented once for each affected worker.
14. Of the poor workers affected by the minimum wage increase, 37 percent have earnings below $8.00 per hour, compared with 27 percent of the near-poor and 19 percent of higher-income families.
15. Of the near-poor workers, 23 percent are the householder's spouse, child, or other relative, compared with 54 percent of those in higher-income families.
16. Of workers in families with higher income, 49percent have earnings above the new minimum wage, compared with 21 percent of poor and 28 percent of near-poor workers.
17. The results are expressed as percentage changes relative to the simulated baseline. As noted in appendix B, simulated baseline results for certain programs are substantially below actual figures, according to administrative data. The percentage changes would be smaller for these programs if calculated relative to actual (rather than simulated) caseload size and benefits.
18. In some cases, the worker receives SSI and experiences the benefit reduction. In other cases, the increased earnings affect the SSI of the worker's spouse or child.
19. The federal government funds public housing through a combination of operating and capital improvement funds. Housing vouchers are funded through congressional appropriations, which are usually set at levels sufficient to renew existing vouchers (Safety Net Almanac 2014). Higher rent payments resulting from the minimum wage increase could reduce the federal funds required to operate public housing, because the additional rent would help fund program operations. The higher rents paid by housing voucher recipients would mean that less money would be required to fund existing vouchers than would have been in the absence of the minimum wage increase.
20. The child tax credit is only partially refundable. Workers with earnings below $3,000 are not eligible for the credit. The credit is equal to 15 percent of earnings above $3,000, up to the maximum credit of $1,000 per child.

Appendix A
Construction of Analysis File

The American Community Survey (ACS) is a survey of American households fielded by the US Census Bureau. When weighted appropriately, the ACS can provide representative information for each of the 50 states and the District of Columbia (DC). Although the ACS reports data by calendar year, it collects data about the prior 12 months on a monthly basis. Respondents in January 2011 are asked about income from January through December 2010, respondents in February 2011 are asked about income from February 2010 through January 2011, and so on until respondents in December 2011 are asked about December 2010 through November 2011. The 2011 ACS, like all one-year ACS files, adjusts reported incomes to represent annual incomes in the middle month of the calendar year.[1]

Though the 2011 ACS file for DC provides a large enough sample to adequately represent DC's population (when weighted), our analysis focuses on low-wage workers; as such we need a somewhat larger sample and turn to the three-year ACS file for 2009–11. The three-year file concatenates three one-year files and reweights the file to represent an average time period.[2] For our analysis, however, we need the data to represent DC's population of low-wage workers in 2011 (the most recent year for which we have data on safety net program rules). Consequently, we reweight the 2009–11 three-year file to represent the 2011 population, matching the population size and characteristics of DC as represented by the single-year 2011 ACS file.

Our reweighting procedure follows the method Dinardo, Fortin, and Lemieux pioneered (1996). We pair data from 2009 and 2011, then 2010 and 2011, and run two separate logistic regressions of an indicator for 2011 on observable characteristics. The predicted probability $P_{2009}(X)$ from the 2009–11 regression and $P_{2010}(X)$ from the 2010–11 regression can be used to adjust the weights in 2009 and 2010, so that the weighted totals by observable characteristics are the same across all three years. The adjustment factor is given by $P/(1-P)$, multiplied by the existing weights, so the new weights are $w_{2009}P_{2009}(X)/[1-P_{2009}(X)]$ in 2009, $w_{2010}P_{2010}(X)/[1-P_{2010}(X)]$ in 2010, and w_{2011} in 2011 (no adjustment). We use a standard logit regression (yielding predictions based on educational attainment and work status, and all interactions of sex, race, and six-year age categories) for the reweighting to 2011 totals.

After assessing the effect of raising the minimum wage on DC families in 2011, we need to adjust those findings so they reflect what DC's population will look like in 2016, when the new minimum wage is fully phased in. To do that, we use forecasts from the DC Office of Planning for the 2016 population by age and sex. (Those forecasts are updated periodically; we use the forecast dated January 15, 2013.) That forecast allows us to reweight our three-year, 2011 file so it represents DC's population in 2016. Specifically, we use nonparametric propensity scores by five-year age category and sex to reweight.

The nonparametric propensity score method is similar the logit regression method described above, but with an important advantage. If the logit regressions include only mutually exclusive and exhaustive indicator variables and all possible interactions of them, then the predicted probabilities are identical to the mean by category of the dependent variable—here, an indicator for 2011. This form of predicted probability is called a nonparametric propensity score, and is optimal in the sense of minimizing mean square error for certain estimates when there are no empty cells, that is, predicted probabilities are never one or zero (Hirano, Imbens, and Rider 2003). When we want to reweight across large dimensions of observable characteristics, such as multiple race, age, and education categories, the large number of dimensions produces empty cells, which precludes the use of the nonparametric propensity score.

Notes

1. The 2011 single-year file uses an adjustment factor for income and earnings dollar amounts of 1.018237, which "inflation-adjusts reported income to 2011 dollars" (US Census Bureau, "2011 ACS PUMS Data Dictionary," October 25, 2012, accessed January 30, 2014 http://www.census.gov/acs/www/Downloads/data_documentation/pums/DataDict/PUMSDataDict11.pdf). Because annual income reported in January 2011 refers to the 2010 calendar year, it should be inflated, but annual income reported in July 2011 refers to half the 2010 calendar year and half the 2011 calendar year and should be inflated less. Because the Census does not identify which month the individual records were collected to preserve confidentiality, an average adjustment is applied to all records. In the 2011 three-year file, the variable "ADJINC inflation-adjusts reported income to 2011 dollars. ADJINC incorporates an adjustment that annualizes the different rolling reference periods for reported income (as done in the single-year data using the variable ADJUST) and an adjustment to inflation-adjust the annualized income to 2011 dollars" (US Census Bureau, "2009–2011 ACS PUMS Data Dictionary," June 21, 2013, accessed January 30, 2014, http://www.census.gov/acs/www/Downloads/data_documentation/pums/DataDict/PUMS_Data_Dictionary_2009-2011.pdf).

2. The sample is reweighted to represent the population across all three years, but with a total population that equals the total estimated population in the final year. So the characteristics of a rapidly changing population are effectively averaged across years. With mean education increasing, for example, the sample will show mean education near the midpoint of the trend.

Appendix B
Baseline Simulation Methodology

Many of the items needed to simulate the effects of a minimum wage increase on family net income are either not present in the American Community Survey (ACS) data or are reported incompletely. This analysis relies on a combination of logical edits and simulation procedures to augment the ACS data. The result of these procedures is a "baseline" data file for the District of Columbia (DC) that includes all the necessary resource elements, with amounts of benefits and tax payments that are as consistent as possible with administrative program data for the 2011 calendar year. The resulting baseline is then used as the starting point for a "hybrid baseline" that sets Supplemental Nutrition Assistance Program (SNAP) benefits and the payroll tax rate to their permanent levels rather than the temporarily higher SNAP benefit and lower payroll tax rate that were in effect in 2011. In addition, the hybrid baseline applies the minimum wage in effect, in Montgomery and Prince George's counties in 2016, to low-wage DC residents working in these counties. The minimum wage simulations are performed based on the hybrid baseline, and results are adjusted to reflect 2016 population estimates and dollar values.

This appendix describes the procedures used to create the 2011 baseline simulation and compares the baseline results of the simulated programs with the administrative targets for 2011.

Data

To provide a sufficient sample size to simulate the minimum wage increase and capture the effects of the increase on families and government programs, we use the 2009–11 ACS, the most recently available three-year ACS file at the time of the analysis. We use an augmented version of the ACS, developed by researchers at the University of Minnesota as part of their Integrated Public Use Microdata Series (IPUMS) project (Ruggles et al. 2000), because it includes imputations of the relationships of individuals in ACS households. Because of the complexities associated with simulating tax and benefit programs for people living in group quarters, we exclude group-quarter residents (including college students living in dormitories) and the institutionalized from the simulations.

The 2009–11 ACS data reflect households interviewed between 2009 and 2011. The survey is conducted monthly and, in each month, a different set of households is surveyed. Households are asked about their income in the 12 months before the survey; thus income amounts reflect data from as early as February 2008 through the end of 2011. The dollar amounts are converted to values reflecting the midpoint of 2011 using adjustment factors provided by the Census Bureau. As described in appendix A, we reweight the data to reflect the 2011 DC population and use the reweighted results when aligning the baseline simulations to 2011 administrative targets.

Procedures

To create the baseline simulations, we augment the ACS data on demographic characteristics, make assumptions about the distribution of work and earnings across the year, add benefits and taxes that are not present in the ACS data, and make adjustments to some program benefits that are underreported in the ACS data. Table B.1 summarizes information regarding the TRIM3 income, benefit, and tax adjustments of most relevance to this analysis. Further details on TRIM3 simulation methods are available on the TRIM3 project's web site (http://TRIM3.urban.org).

TABLE B.1

TRIM3 Baseline Simulations and Income Adjustments

ACS and IPUMS data	Methods
Elements of family net income not reported in ACS data	
Payroll taxes	Computed based on wages and type of employment
Income taxes	Filing status: Married couples assumed to file jointly on their federal tax return but may file separately on their DC return; unmarried householders with qualifying dependents file as head of household; others file individual returns.
	Dependency: TRIM3 checks if a person can be a dependent of a parent; if not, then a dependent of a householder. When there are two unmarried parents, one parent claims all the children; noncustodial parents who sometimes claim their children for tax purposes are not modeled.
	Deductions: Mortgage interest set at 80 percent of mortgage payment; property tax deduction taken as reported; state tax deduction based on greater of state income taxes (from preliminary state tax simulation) and state sales tax deduction (from IRS look-up table); average charitable contributions assigned based on IRS data (by adjusted gross income level and state). State taxes recalculated based on final federal tax simulation.
	Filing behavior: All units are assumed to submit returns.
SNAP	Filing unit: Households containing TANF or children under 18 are split into maximum number of SNAP filing units allowed under SNAP regulations, under the assumption that each unit buys and prepares food separately. All other households file as single households.
	Eligibility is simulated monthly, using national and DC policies. Eligible units that report receiving SNAP are assigned to participate. Additional eligible units are selected as participants so totals come close to targets, in total and by subgroups.
	Benefits are computed by the model for each eligible month.
Public and subsidized housing	Residence in subsidized housing is randomly assigned to income-eligible renters who are eligible for a positive subsidy to reach control totals by income level and other demographic characteristics; reported rent is used for clues. Subsidy is valued at FMR minus household's required rental payment (maximum of 30 percent of adjusted or 10 percent of gross income).
LIHEAP	Eligibility is simulated annually. Recipients are selected from households simulated as eligible to reach targets by household type.
	DC's per-household average benefit is assigned to all recipients.
WIC	Eligibility is identified monthly for infants, children, and mothers of infants. (Pregnant women cannot be identified in the ACS.) Recipients are randomly assigned among eligible individuals, by type.
	Recipients are assigned the per-person average benefit (varies for infants, children, and women).
Child care expenses	TRIM3 identifies likely child care subsidy recipients and assigns copay. Equations based on the Survey of Income and Program Participation impute likelihood and amount of expenses for other families; aligned to targets from the CPS ASEC for calendar years 2010 and 2011.
Cash resources collected in the ACS data	
Earnings, asset income, Social Security	Taken from the ACS data; but some very high SSI amounts are reclassified as Social Security.
SSI	SSI-eligible individuals (adults and children) are identified by TRIM3; a portion of them are selected as recipients so that, together with reported recipients, the caseload comes close to targets.
	Monthly benefits are simulated by the model, including DC supplements.
TANF and other welfare	The ACS includes a variable called "welfare" that includes TANF and general assistance. The model first selects some of this income as TANF, based on a logical edit that assigns the amount as TANF if there are dependent children under age 19 and if the family is sufficiently low income to be eligible for TANF.

TABLE B.1 CONTINUED

ACS and IPUMS Data	Methods
TANF and other welfare	TANF eligibility is simulated using DC's policies; a portion of eligible units is selected so the caseload comes close to targets for the size and composition of the caseload.
	Monthly benefits are simulated by the model using DC policies.
UI, child support, other income	The ACS includes an income variable called "other" that includes UI, child support, and other income. The portion that is UI income and child support is predicted based on a multinomial logit equation.
	The allocation of child support, unemployment compensation, and other income enables each program to distinguish between these where appropriate. For example, TRIM3 captures TANF rules related to child support income and does not tax child support income. This analysis does not correct for underreporting of child support or unemployment compensation.

Source: Adapted from Table B1 in Wheaton et al. (2011).
Notes: CPS ASEC = Current Population Survey Annual Social and Economic Supplement; FMR = fair market rent; LIHEAP = Low Income Home Energy Assistance Program; SNAP = Supplemental Nutrition Assistance Program; SSI = Supplemental Security Income; UI = unemployment insurance; WIC = Women, Infants, and Children.

Demographic Characteristics

Creating the net income measure with the ACS data first requires understanding the family relationships among members of ACS households. The ACS includes each person's relationship to the householder, but it does not ask for interrelationships among other individuals. As previously mentioned, we use the IPUMS version of the data to obtain additional imputations of family relationships.

The detailed information about family relationships is required for modeling the government benefit and tax programs, as each tax and transfer program is simulated according to the unit definition that is appropriate for the program. For example, the filing unit for Temporary Assistance for Needy Families (TANF) includes parents and their dependent children (but does not include other members of a household), and the filing unit for federal income taxes is an unmarried individual or a married couple together with their dependents. The income, benefits, child care expenses, and taxes of each family member are combined to create net family income, where "family" includes all persons related by blood, marriage, or adoption. Children under the age of 15 who are unrelated to anyone else in the household are included as members of the householder's family.

Immigrant status is also incompletely reported in the ACS. The ACS indicates whether an individual is a citizen, but (like most surveys) does not distinguish among different categories of noncitizens: legal permanent residents, refugees or asylees, temporary residents, and undocumented residents. Eligibility for government benefits varies by immigrant status and year of arrival. Following procedures developed by Jeffrey Passel and others, some noncitizens are identified as refugees or asylees (Passel, Van Hook, and Bean 2004). Other noncitizens are treated as legal permanent residents, although some of these are likely undocumented aliens or temporary residents; thus, we may assign benefits to some noncitizens who, in reality, would be ineligible.

Initial Processing of Unearned Income

The steps required to adjust unearned income reported in the ACS include addressing apparent confusion between ACS-reported Supplemental Security Income (SSI) versus Social Security income, separating "welfare" income into TANF benefits and other welfare benefits, and separating "other" income into three components: unemployment insurance benefits, child support, and other income.

SSI is reported directly in the ACS data, but many reported amounts appear to exceed the maximum possible annual SSI benefit, suggesting confusion with Social Security. A logical edit reassigns some high reported SSI amounts as Social Security. SSI is also reassigned as Social Security if the recipient's other income suggests that the person could not have been eligible for SSI.

TANF benefits are reported in response to an item that asks about "any public assistance or welfare payments from the state or local welfare office." We consider this amount to be TANF if the family has dependent children and appears eligible for benefits based on its characteristics and other income; otherwise, the reported amount is considered "other welfare."

The final income question in the 2011 ACS (following questions about earnings, interest and other asset-based income, Social Security, SSI, welfare, and retirement income) asks for any other type of cash income. This could include unemployment benefits, child support, veterans' benefits, alimony, and worker's compensation. It is important in the modeling to separately identify unemployment compensation and child support. We predict the likelihood share of this "other" income to be unemployment benefits or child support income using regression techniques.[1] The remainder is left as a combined other-income amount.

Distributing Work and Income across the Year

The ACS collects information on each person's weeks of work during the year, in ranges (0–13, 14–26, 27–39, 40–47, 48–49, or 50–52), and also asks about annual earnings. However, the TRIM3 model's simulation of benefit programs generally operate monthly, capturing the fact that a family may be eligible for a benefit in only part of a year or may be eligible for different levels of benefits in different months of the year. TRIM3 imputes a specific number of weeks of work to each worker, within the reported range, following the methods described in appendix C. Once a specific number of weeks of work is imputed, a starting month is randomly chosen, and the weeks of work are assigned consecutively beginning in that month ("wrapping around" to January if needed). The ACS-reported annual earnings amounts are assigned to the months, assuming the same hours of work and the same hourly wage in all weeks of work during the year.

Different procedures are used for unearned income amounts. Most annual unearned-income amounts reported in the ACS are divided across the months, assuming that the income is received in 12 equal installments. This assumption is made for Social Security, retirement income, the combined amount of interest and other asset-based income, the portion of welfare income that does not appear to be TANF, and the portion of "other" income that does not appear to be either unemployment insurance benefits or child support. The portion of ACS-reported "other" income that appears to be child support is allocated across the months of the year by first imputing a number of months of receipt using probabilities derived from Survey of Income and Program Participation data (the probabilities vary by the annual amount and by TANF receipt status), and then assigning the selected number of months to specific months of the year, beginning with a randomly selected starting month. The annual amount of unemployment compensation reported in the survey is generally allocated across the weeks of unemployment or the maximum possible weeks of benefits in DC, whichever is smaller. However, the weeks of receipt are adjusted if necessary to ensure that the weekly benefit amount falls within the range of minimum and maximum weekly benefit amounts in that state. Also, a one-month lag in receipt is modeled for 29 percent of recipients. Monthly amounts of SSI and TANF are generated by the TRIM3 simulations.

Simulating Benefit Programs

Once the initial steps described above are performed, simulation techniques are used to bring total SSI and TANF participation and benefit amounts closer to actual figures for 2011. Also, several types of benefits included in net income are missing from the ACS data, including SNAP benefits (the 2011 ACS asks if any SNAP benefits are received but does not ask for the amount), public or subsidized housing, WIC, and LIHEAP. Information on child care subsidies is also needed as part of the computation of child care expenses. For each of these benefits, it is important that the "baseline" simulations come as close as possible to the actual programs in terms of caseload and benefits.

The same general procedures are used to simulate all the government benefit programs: SSI, TANF, SNAP, WIC, LIHEAP, housing assistance, and child care subsidies. In each case, TRIM3 first estimates eligibility and potential benefits, coming as close as possible to the specific eligibility and benefits policies used in DC during 2011. This includes modeling each program's policies for filing units, income,

deductions, eligibility tests, and benefit or copayment computation. In the case of the programs that are captured to some extent in the ACS data (TANF, SSI, and SNAP), individuals or families who appear eligible and who reported the income form the foundation of the simulated caseload. Additional recipients are identified from among the eligible individuals or families who did not already report the benefit. The selection of the additional caseload is made in such a way that the simulated caseload comes acceptably close to the actual caseload in overall size and characteristics. For all programs, except LIHEAP, the simulation operates monthly, capturing the fact that a family's eligibility or benefit level may vary across the months of the year.

Simulating Tax Programs

The net income measure requires knowing an individual's payroll tax payments, federal income taxes, and DC income taxes. None of these items are included in the ACS. The payroll tax simulation is straightforward, based on an individual's earnings and his or her type of employment. Modeling income taxes is more complex, first requiring a determination of tax-filing units and dependency relationships. As with the modeling of benefit programs, the modeling of income taxes follows the actual policies as closely as possible. (Some income tax policies affecting primarily higher-income tax units are not modeled, such as deductions for individual retirement accounts.)

The modeling of income taxes includes both refundable and nonrefundable credits at both the federal and DC levels. Tax units are generally assumed to take all federal income tax credits that are available. The modeling of DC income taxes includes the earned income tax credit (EITC), child and dependent care credit, and low income credit. We do not model DC's homeowner and renter property tax credit, noncustodial parent EITC, or out-of-state income tax credit.[2]

The tax simulations do not include alignment to targets. Each family's tax liability is determined by the tax policies and the family's characteristics and income. All families are assumed to pay all taxes owed.

Estimating Child Care Expenses

The family net income measure subtracts child care expenses from other resources. To estimate child care expenses, we rely first on the simulation of subsidized child care; for a subsidized family, the child care expense equals the amount that the family would be required to pay in copayment under DC policies. For an unsubsidized family, child care expenses are imputed using a regression equation.

Cross-Simulation Consistency

One feature of the simulations is their internal consistency. Each simulation's results may be used by subsequent simulations, creating a comprehensive and internally consistent picture of a family's income, benefits, and taxes. For example, SSI recipients (both those who reported SSI and those who were added by the simulation to reach program totals) are excluded from TANF assistance units; the adjusted amounts of SSI and TANF benefits are used in computing cash income for purposes of SNAP benefits and child care subsidies; and the rent amounts imputed by the housing simulation are used to determine the SNAP excess shelter deduction. All tax and benefit amounts are computed consistent with program rules and a family's detailed information; in other words, there are no "across the board" percentage adjustments to families' tax and benefit amounts in order to come closer to targets. (As discussed above, the selection of which eligible families receive a benefit is made to come close to targets; however, for families receiving a benefit, the benefit amount is as computed by the model.)

Results

To provide the best estimate of the impact of alternative policies, it is important that the project uses data on DC's population in which the incidence and amounts of various benefits and taxes are consistent as possible with actual figures for 2011. Table B.2 compares the results of the TRIM3 simulation procedures described above with program administrative data.

Despite the level of detail included in the simulations, we do not expect the simulated program data to exactly match 2011 program administrative data, for at least three reasons. First, the estimates are based on a survey rather than the full population. Second, the simulations cannot exactly capture all nuances of the programs. Third, the economic circumstances captured in the data reflect the combination of calendar years 2008 to 2011, adjusted for inflation and population change.

Focusing first on benefit programs, the baseline results are within 10 percent of target for the number of units receiving LIHEAP, public or subsidized housing, SNAP, and SSI, as well as for the number of infants and children receiving WIC and child care subsidies. The baseline falls just over 20 percent short of target for the 17,500 families receiving TANF or other family cash assistance. Because pregnancy status is not identified in the ACS, the model does not capture WIC benefits for pregnant women; WIC benefits are assigned to under a third of the number of women receiving WIC according to administrative data. The baseline is within 10 percent of target for aggregate annual benefits for SSI, LIHEAP, and child care subsidies. Aggregate SNAP and WIC benefits are approximately 20 percent below administrative targets. The baseline is close to target for the total number of families with child care expenses according to CPS ASEC data for 2010 and 2011.

The amount of payroll tax paid in DC during 2011 is 5 percent below target, and the number of workers subject to payroll taxes is 13 percent below target.[3] The simulated number of DC tax units with positive federal income tax liability is 12 percent higher than the target, although the amount of simulated tax liability falls 2 percent short of target. Average tax liability is within 10 percent of target for positive tax returns with adjusted gross income below $100,000. The ACS does not capture all the income of higher-income taxpayers and so our estimates do not fully capture the taxes paid by this group.[4]

Focusing on lower-income tax units, TRIM3 finds fewer tax units receiving the federal EITC (68 percent of target) and further understates the amount of EITC received (40 percent of target). This is a problem often faced by tax simulation models that rely on survey data, as they typically do not capture real-world situations, such as cases where a noncustodial parent rather than a custodial parent claims the children for EITC purposes. The child tax credit is below target for similar reasons, although the child and dependent care credit is close to target for the amount of the credit. The number of DC state income tax returns simulated with positive tax liability comes close to target (98 percent), but total tax collections are simulated to be about 9 percent higher than the administrative total. The DC child care credit is within 10 percent of target. The DC EITC, like the federal EITC, is substantially below target.

TABLE B.2

TRIM3-Simulated Benefit and Tax Data versus Targets: District of Columbia 2011

	ACS-reported benefits	TRIM3-simulated, 2011 ACS data	2011 administrative data[a]	TRIM3 ACS as % of administrative
SSI (noninstitutionalized)				
Average monthly caseload (thousands of people)		24	24	100.0
Adults		20	20	100.2
Children		4	4	98.9
Annual benefits, adults + children (millions)[b]	$108.0	$150	$164	91.8
TANF (including separately funded programs)				
Average monthly caseload (thousands of units)[c]		13.8	17.5	78.9
Average monthly benefit		$338	--	--
Annual benefits (millions)[d]	$35.2	$55.815	--	--
SNAP				
Average monthly caseload (thousands of units)		78	77	100.2
Annual benefits (millions)	NA	$193	$234	82.4
Public and Subsidized Housing				
	NA	33	32	102.2
Ever-subsidized households by characteristics (overlapping)				
Elderly head or spouse		10.4	8.9	116.6
Disabled nonelderly head or spouse		7.4	6.0	123.9
Household contains children		12.5	12.8	98.0
Female head with children		10.4	12.1	85.4
Average size of household		2.2	2.2	98.5
Average monthly rental payment		$310.9	$321.5	$96.7
Annual value of subsidy (millions)	NA	$459.4	--	--
LIHEAP				
Assisted households (thousands of households)[e]		26.8	27.0	99.2
Annual benefits (millions)	NA	$16.7	$16.7	100.1
WIC				
Average monthly recipients, infants/children (thousands)	NA	12.1	12.3	98.2
Average monthly recipients, women (thousands)[f]		1.2	4.2	29.0
Annual value of benefit, pre-rebate (millions)[f, g]	NA	$10.9	$13.8	79.1
Child care subsidies[h]				
Average monthly children with subsidies (thousands)		18.2	20.0	90.8
Average monthly families with subsidies (thousands)		9.6	--	--

TABLE B.2 CONTINUED

	ACS reported benefits	TRIM3-simulated, 2011 ACS data	2011 administrative data[a]	TRIM3 ACS as % of administrative
WIC				
Aggregate copayment (millions)		$8.8	--	--
Families with non-$0 copay		62%	--	--
Average non-$0 copay		$76	--	--
Average non-$0 copay as % of income		4.3%	--	--
Value of the subsidy (millions)[i]	NA	$90.3	$89.7	100.6
Child Care Expenses, Total, Unsubsidized and Subsidized, Families with Children <15[j]				
Average monthly families with work-related child care expenses (thousands)		15	16	96.8
Aggregate work-related expenses (millions)	NA	$160	$160	100.0
Payroll Taxes[k]				
Workers subject to OASDI tax (thousands)	NA	336	387	87
Earnings subject to OASDI tax (millions)		$16,811	$17,544	96
OASDI and HI taxes paid by workers and employers (millions)		$2,372	$2,503	95
Federal Income Taxes, Returns, and Liability[l]				
Number of positive-tax returns (thousands)	NA	269	239	112
with AGI <$50,000		143	105	136
with AGI $50,000–< $100,000		86	75	114
with AGI >= $100,000		69	59	118
Average tax liability, positive-tax returns		$3,823	$3,914	98
with AGI <$50,000		$1,972	$2,161	91
with AGI $50,000–< $100,000		$8,988	$8,506	106
with AGI ≥ $100,000		$40,087	$51,934	77
Total tax liability, positive-tax returns (millions)		$3,823	$3,914	98
Federal Income Tax Credits				
Earned income tax credit	NA			
Returns with credit (thousands)		39	57	68
Total credit (millions)		$51	$128	40
Child tax credit (nonrefundable portion)				
Returns with credit (thousands)		22	28	78
Total credit (millions)		$25	$27	92
Child tax credit (refundable portion)				
Returns with credit (thousands)		14	38	37
Total credit (millions)		$17	$45	38

TABLE B.2 CONTINUED

	ACS reported benefits	TRIM3-simulated, 2011 ACS data	2011 administrative data[a]	TRIM3 ACS as % of administrative
Federal Income Tax Credits				
Total child tax credit, amount (millions)		$42	$72	58
Child and dependent care tax credit				
Returns with credit (thousands)		$13	$15	87
Total credit (millions)		$9	$9	102
DC Income Tax[m]				
Returns with positive tax liability (thousands)	NA	276	282	98
Tax collections ($ million)		$1,424	$1,311	109
State child and dependent care credit				
Returns with credit (thousands)		17	17	101
Total credit (millions)		$3	$4	93
State EITC				
Returns with credit (thousands)		38	56	68
Total credit (millions)		$20	$53	38

Notes: The symbol "--" denotes that an administrative data figure was not available. NA = not applicable.
[a] Administrative figures are adjusted or combined for consistency with simulation concepts.
[b] SSI is reported separately in the ACS data. Administrative data for SSI include retroactive payments, which are approximately 9 percent of total payments; TRIM3 does not simulate retroactive payments.
[c] In the average month of 2011, an average of 8,200 families received federally funded TANF benefits, but an additional 9,300 received cash aid from other funds, for an estimated total of 17,500 (see DC Action for Children 2011). The federally funded cases included 2,100 child-only units; the remainder were single-parent units. Information on the composition of the non–federally funded caseload was not obtained.
[d] TANF is not reported separately in the ACS data. The ACS figure shown is the amount of welfare reported by families with children.
[e] LIHEAP administrative data figures are the average of figures for fiscal years 2011 and 2012.
[f] The administrative data include benefits for pregnant women (as well as infants, children, and postpartum and breastfeeding mothers). The TRIM3 simulation does not include pregnant women because pregnancy is not identified in the ACS data.
[g] The value shown is before the rebate that reduces Food and Nutrition Services's cost of purchasing infant formula.
[h] The administrative data figure includes 1,300 served by the federal Child Care and Development Fund in the average month, plus an estimated additional 18,700 children served with other funds. An estimate of total subsidized families was not available.
[i] The administrative figure for the value of the subsidy is from the DC Fiscal Policy Institute (2010).
[j] The administrative figures shown for total child care expenses are from CPS ASEC survey data, averaged across the CPS ASEC files for calendar years 2010 and 2011.
[k] Payroll tax targets for Old Age, Survivors, and Disability Insurance and Health Insurance are obtained from the 2013 Social Security Administration's Annual Statistical Supplement. OASDI tax amounts in the supplement do not reflect the lower tax rates on the worker's share of the tax in effect in 2011. We have adjusted the target to take this into account.
[l] IRS Statistics of Income Division, Table 2. Individual Income and Tax Data, by State
[m] DC Statistics of Income, "Selected Income and Tax Items for Individual Income Tax Returns for tax year 2011," Office of the Chief Financial Officer, http://cfo.dc.gov/node/232462.

Notes

1. We used the Current Population Survey (CPS) to estimate this regression. Since all the elements of the ACS "other" income are reported separately on the CPS, we could create a combined "other" income variable to match the one represented in the ACS. The multinomial logit regression was estimated to predict the share of income attributable to unemployment insurance, child support, and other income. See Martinez-Schiferl (2011) for a detailed description of these procedures.

2. The renter property tax credit is included in the examples of hypothetical households, but not in the simulations, as this has not yet been incorporated into the TRIM3 model.

3. It is possible that some portion of the workers in DC covered by payroll taxes according to the target data live outside DC. State assignments are based on residence at the end of the year, but the location of the employer is used for employers who file their reports on paper rather than electronically.

4. For example, the ACS does not ask respondents to report capital gains income, and income is top-coded to preserve confidentiality.

Appendix C
Simulating Minimum Wage Increases

The simulation estimates were prepared using data from the 2009–11 American Community Survey (ACS)[1] and are representative of the DC household population (see Appendix A for further information about the ACS). Persons living in group quarters and institutions (such as college dormitories and homeless shelters) are excluded from the simulation estimates because of data limitations and the complexities associated with determining the eligibility of these groups for government benefits.

To be identified as potentially affected by a minimum wage increase, a DC resident must (1) report working at least one week of the year; (2) report current (or most recent) employment as a wage or salary employee (persons who are primarily self-employed, unincorporated, or who work without pay in a family business are not counted as being directly affected by a minimum wage increase, although they may be indirectly affected through additional income earned by other family members); (3) work in a jurisdiction (DC, Montgomery County, or Prince George's County) where the minimum wage is being increased; and (4) have estimated hourly earnings (including tips) of at least $5.50 per hour (in 2016 dollars) and no more than $2.00 above the new minimum wage.

We allow persons with hourly wages as low as $5.50 to be affected by the minimum wage increase because the ACS does not permit precise identification of a worker's hourly earnings, and we assume that some who appear to be working below the minimum wage are actually minimum wage workers. Workers with hourly earnings as much as $2.00 above the new minimum wage are assumed to be affected through spill-over effects. Because of the measurement error in identifying minimum wage workers, some of these workers could be working at the minimum wage. Depending on the simulation, we simulate that some workers with earnings between $5.50 and the new minimum wage will lose their jobs rather than experience an increase in earnings.

Although tipped workers are subject to a lower minimum wage ($2.77), employers are required to ensure that they receive at least the full minimum wage through their combined income from wages and tips. Tips are not reported separately on the ACS, but are included in the worker's total reported earnings. Therefore, our estimates capture the effect of bringing the combined wage and tip earnings of tipped workers up to the new minimum wage.

Additional details regarding the identification of estimated hourly earnings, work jurisdiction, the earnings range affected by the minimum wage increase, and disemployment effects are provided below.

Estimated Hourly Earnings

We estimate hourly earnings by dividing a worker's annual income from wages, salaries, and tips by the product of the weeks worked and usual hours of work per week. Weeks of work are reported in ranges on the ACS: less than 13, 14 to 26, 27 to 39, 40 to 47, 48 to 49, and 50 to 52. To estimate hourly earnings, we must assign a specific number of weeks of work from the range reported on the ACS. To do so, we use data from the Current Population Survey Annual Social and Economic Supplement (CPS ASEC)—a supplement to the basic monthly CPS interview. The CPS ASEC is conducted in the spring of each year and provides information on work and income in the prior calendar year, including the information on total wages, weeks of work, and usual hours worked per week needed for calculation of estimated hourly earnings. To build a sufficient sample size for estimates based on data for DC residents, we combine data from the 2009, 2010, 2011, and 2012 CPS ASEC.

We assign a specific number of weeks of work to workers in the ACS using cumulative probabilities developed from the CPS ASEC. Cumulative probabilities are developed for (1) workers with wage or salary income but no self-employment income; and (2) all workers, including those with self-employment income. We use the cumulative probabilities from the second group for workers who have both wage and self-employment income, as the sample size is insufficient to develop separate estimates for this group.[2] The cumulative probabilities vary by weeks of work range (e.g., 1 to 13 weeks) and minimum hourly earnings range, which are calculated by dividing the worker's annual earnings by the product of the usual hours worked per week and the maximum number of weeks of work within the applicable weeks of work range. This allows us to capture a worker with higher minimum hourly earnings who worked more weeks within a given range than a worker with lower minimum hourly earnings. The minimum hourly earnings ranges vary by weeks of work range and are defined in such a way as to provide sufficient sample size for estimation while, to the extent possible, providing different probabilities for workers with minimum hourly earnings in the range most likely to be affected by the minimum wage increase.

To assign weeks of work to workers in the ACS, we first calculate the minimum hourly earnings group for the worker. For example, if a worker reported working between 1 and 13 weeks, for 40 hours per week, the minimum hourly earnings of the worker would be $2.46, if annual earnings are $1,280 ($1.280 / (13 × 40)), and $8.00 if annual earnings are $4,160 ($4,160 / (13 × 40)). Each worker is then assigned a uniform random number. A worker is assigned the lowest number of weeks of work for which the random number is less than or equal to the corresponding cumulative probability for his or her minimum hourly earnings range. For example, a worker whose minimum hourly earnings are less than $7.59, reports working between 1 and 13 weeks during the year, does not have self-employment income, and has a random number of 0.48 would be assigned as working 6 weeks of the year based on the data shown in table C.1. For the worker earning $1,280, the resulting estimated hourly earnings would be $5.33 ($1,280 / (6 × 40)).

TABLE C.1

Cumulative Probabilities for Weeks Worked by DC Residents

Weeks worked	Minimum Hourly Earnings Range		
	< $7.59	$7.59–$13.28	> $13.28
1	0.02582	0.00000	0.02103
2	0.09177	0.00000	0.02103
3	0.14871	0.02864	0.02103
4	0.29159	0.10279	0.14341
5	0.33599	0.15889	0.24378
6	0.49269	0.19691	0.30159
7	0.52894	0.22464	0.30159
8	0.72334	0.41909	0.43363
9	0.72998	0.43267	0.46733
10	0.83291	0.64667	0.64877
11	0.84277	0.64667	0.67764
12	0.99475	0.95343	0.98130
13	1.00000	1.00000	1.00000

Source: Urban Institute analysis of DC residents in the 2009–12 CPS ASEC.
Note: Group-quarters residents and persons with self-employment income are excluded from these probabilities.

Table C.2 shows the distribution of DC wage and salary workers by estimated hourly earnings in the 2008 to 2011 CPS ASEC data and the distribution achieved in the ACS after each worker has been assigned a specific number of weeks of work. The distributions are similar: 15.2 percent of DC workers in the CPS ASEC fall in the range most relevant to the minimum wage increase ($5.00 to $11.24) compared with 15 percent in the ACS. Another 5.8 percent fall between $11.24 and $13.28, compared with 5.7 percent in the ACS.

TABLE C.2

Estimated Hourly Wage and Salary Earnings for DC Residents 2009–11 ACS (After Assignment of Weeks of Work) and 2009–12 CPS ASEC

Estimated hourly earnings	Sample count	ACS 2009–11 Number[a]	Percent	CPS ASEC 2009–12 (percent)
< $1.00	0	0	0.0	0.4
$1.00–< $3.00	148	5,645	1.8	1.7
$3.00–< $5.00	227	7,873	2.5	2.6
$5.00–< $6.00	178	6,757	2.2	1.9
$6.00–< $7.59	260	10,210	3.3	3.8
$7.59–< $8.25	101	4,086	1.3	2.0
$8.25–< $10.00	359	13,298	4.3	3.9
$10.00–$11.24	289	10,728	3.5	3.6
> $11.24–$13.28	451	17,753	5.7	5.8
> $13.28–$15.00	437	16,015	5.2	4.7
$15.00+	6,473	218,217	70.3	69.6
Total	8,923	310,582	100.0	100.0

Note: The pool examined excludes group-quarters residents and persons with self-employment income.
[a] The weighted results shown here use the standard 2009–11 ACS weights before adjustment.

Work Jurisdiction

The ACS identifies the county and state of work for persons who worked in the week prior to the survey. Place of work is missing for about one-fifth of low-wage workers, because they were not working in the week prior to the survey. We impute work jurisdiction for these workers using a multinomial logit model based on the workers with available data. Given the possibility that full-year workers have different commuting patterns than those who work for part of the year, we restrict the sample to workers who work for less than 50 to 52 weeks of the year (the highest weeks of work range in the ACS). Because our focus is on workers potentially affected by a minimum wage increase, we further restrict the sample to low-wage workers (defined here as those with estimated hourly earnings of less than $15.00), yielding a sample of 517 for the model estimation. We used $15.00 rather than a lower dollar amount as the cut-off because of sample size limitations.

The multinomial logit estimates the likelihood that a low-wage DC resident who works for less than the full year works in DC, Maryland, or another state. "Other" state primarily reflects Virginia, but can include other states (for example, if a DC resident recently moved to the area and has not yet obtained a job, or commutes to a job outside of the immediate area). Because of sample size limitations, DC residents who are imputed to work in Maryland are treated as if they work in Montgomery or Prince George's County.

Explanatory variables for the multinomial logit include poverty status (below 200 percent of poverty), education (less than or equal to a high school diploma), age (under 25), sex, race and ethnicity (non-Hispanic black versus other), occupation (personal care/social/health support services, food services/retail, and office and administrative support, with all other occupations as the reference group), and place of residence within DC (central business district, North, Northeast, or Southeast, with Northwest as the reference category). Results of the multinomial logit are shown in table C.3. For each low-wage worker with missing work jurisdiction, we use the multinomial logit model to compute probabilities that he/she works in Maryland (Montgomery or Prince George's County) or some other

state. We then compare the probabilities to a uniform random number to assign work jurisdiction. For example, if the model predicts that a worker has a 13 percent probability of working in Maryland and a 10 percent probability of working in another state and the worker's random number is less than or equal to 0.13, then we assign the him/her to work in Maryland. Under the same probabilities of work location, if the random number, if the random number is greater than 0.13 but less than or equal to 0.23 (0.13 + 0.10), then we assign another state. Finally, with the same conditions and if the random number is greater than 0.23, we assign him/her to DC.

Table C.4 shows the work location of low-wage DC residents and the extent to which this is based on reported versus imputed information. The first columns show the results for all wage and salary earners with estimated hourly earnings below $15.00 (the subgroup used for the imputation of location of work). The last columns show the results for workers with estimated hourly earnings between $5.00 and $12.28 ($13.50 in 2016 dollars)—the group potentially affected by the minimum wage increase, either directly or through spill-over effects. Workers with imputed place of work are estimated to be somewhat less likely to be working in DC than is true for those with a reported place of work. This is explained by the characteristics of the workers requiring imputation. Of the workers requiring imputation, 56 percent had no more than a high school education, compared with 28 percent of those with a reported place of work. The results of the multinomial logit suggest that, all else equal, the odds that a low-wage worker with no more than a high school education works outside of DC are nearly twice as high as the odds for those with more education.

TABLE C.3

Predicting the State of Work for DC Residents by Place of Residence, Occupation, and Demographic Characteristics

	Multinomial Logit Coefficients		Odds Ratio Point Estimates	
Independent variables	Maryland vs. DC	Other state vs. DC	Maryland	Other state
Below 200 percent of poverty	-0.3996***	-0.4473***	0.671	0.639
	(0.0464)	(0.0501)		
High school diploma at most	0.6351***	0.5717***	1.887	1.771
	(0.0531)	(0.0624)		
Under 25	-0.2273***	0.0361	0.797	1.037
	(0.0482)	(0.0504)		
Female	-0.7061***	-0.109*	0.494	0.897
	(0.0473)	(0.0491)		
Non-Hispanic, black only	-0.2699***	-0.1448*	0.763	0.865
	(0.0627)	(0.0716)		
	Occupations			
Community, social, personal care, and health care support service	0.2832***	-1.6012***	1.327	0.202
	(0.0675)	(0.1008)		
Food and sales and related	1.0266***	-0.0188	2.791	0.981
	(0.0584)	(0.0619)		
Office and administrative support	0.0431	-0.9861***	1.044	0.373
	(0.073)	(0.0817)		
	Place of Residence within DC[a]			
Central business district (PUMA=105)	-0.9448***	-0.7789***	0.389	0.459
	(0.0958)	(0.0788)		
Northern (PUMA=102)	0.0556	-0.1639*	1.057	0.849
	(0.0835)	(0.0751)		
Northeastern (PUMA=103)	0.1597*	-1.2041***	1.173	0.3
	(0.0786)	(0.0871)		
Southeastern (PUMA=104)	0.2646**	-0.502***	1.303	0.605
	(0.0971)	(0.1008)		
Constant	-1.5079***	-0.9297***		
	(0.0747)	(0.0658)		

Notes: Population includes non–self-employed workers estimated to earn less than $15/hr and who worked fewer than 50 weeks last year.
N = 517 unweighted, 19,066 weighted. Chi-square (df=24) = 2139.65, p<.0001.
[a] PUMA stands for Public Use Microdata Area. A map of DC PUMAs can be found here:
https://usa.ipums.org/usa/resources/volii/maps/dc_puma5.pdf
*p<.05; **p<.01; ***p<.001

TABLE C.4

Location of Work of Low-Wage DC Residents by Estimated Hourly Earnings Level 2009–11 ACS

	Earning <$15.00 per Hour				Earning $5.00 to $12.28			
	Number	Percent working in			Number	Percent working in		
		DC	MD	Other		DC	MD	Other
	Reported Place of Work							
All	75,383	75.6	15.3	9.1	45,917	76.1	14.9	9.0
< 50 weeks	20,008	76.7	13.2	10.1	12,301	78.8	10.7	10.5
	Imputed Place of Work							
All	21,148	72.3	15.3	12.4	12,574	72.1	16.2	11.7
	Total Reported and Imputed							
All	96,531	74.8	15.3	9.9	58,492	75.2	15.2	9.6

Note: Results are reweighted to reflect the population in 2011.

Earnings Range for the Simulated Minimum Wage Increase

Our simulations show the effects on DC residents of the DC minimum wage increase in 2016, compared with a baseline with no increase to the DC minimum wage. To simulate the increase, we deflate DC's fully-phased in, 2016 $11.50 minimum wage to 2011 dollars (reflecting the year of our data). We deflate using the annual consumer price index for urban consumers and assume 2 percent inflation for each year after 2013, yielding a minimum wage of $10.46 in 2011 dollars. The results of the simulations are then weighted to reflect 2016 population estimates and dollars are adjusted to 2016 levels.

The baseline and minimum wage simulations also incorporate the effects of the increased minimum wage in Prince George's and Montgomery counties. These counties do not fully phase in their new minimum wage until 2017 and so we use their 2016 value ($10.75), deflated to $9.78, to simulate the minimum wage increase for DC residents working in these counties.

Workers whose estimated hourly wages equal the current minimum wage are assigned the new minimum wage. We adjust the wages of three additional groups of workers: (1) those whose current wage is above the current minimum wage but below the new minimum wage; (2) those whose current wage is less than $2.00 above the new minimum wage; and (3) those whose current wage is between $5.00 per hour and the current minimum wage. We assume that workers in these groups will experience spill-over effects in which employers adjust wages to preserve some of the relative pay differences in their firms. Adjusting the wages of these workers also helps compensate for the imprecision of the estimate of hourly earnings, recognizing that some of those with earnings near but not at the current minimum wage are actually minimum wage workers. The adjustments to those below the current minimum wage and above the new minimum wage are made linearly so that they line up with actual wages outside the spill-over range.

The formula for those below the current minimum wage and above $5.00 is as follows:

$NW = NMW - ((OMW\text{-}CW) \times ((NMW - \$5.00) / (OMW - \$5.00)))$, where "NW" is the new wage, "NMW" is the new minimum wage, "OMW" is the old minimum wage, and "CW" is the current wage.

Under this formula, workers with hourly earnings above $5.00 but below the old minimum wage are assigned additional earnings such that earnings increase linearly from $5.00 to the new minimum wage.

The formula for those above the old minimum wage, but no more than $2.00 above the new minimum wage ($1.82 in 2011 dollars) is as follows:

$$NW = NMW + ((CW\text{-}OMW) \times (\$1.82 / (NMW + \$1.82 - OMW))).$$

Under this formula, workers who have earnings just above the old minimum wage are assigned earnings just above the new minimum wage, with the increase in earnings phasing down to zero as earnings approach $2.00 above the new minimum wage.

Disemployment Effects

Our simulations of disemployment effects assume that some workers with estimated hourly earnings between $5.00 and the new minimum wage may lose their jobs. Those whose earnings are already above the new minimum wage are not simulated as at risk of job loss. For workers who could potentially lose their jobs, the probability of job loss is calculated by multiplying the change in the worker's hourly earnings by 0.1. If the random number assigned to the worker is less than or equal to the resulting probability of job loss, the worker is assigned to lose his or her job.

Notes

1. We use the Integrated Public Use Microdata Series version of the ACS prepared by the University of Minnesota, Steven Ruggles, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek, Integrated Public Use Microdata Series: Version 5.0 [Machine-readable database], (Minneapolis: University of Minnesota, 2010).

2. We also use the cumulative probabilities from the second group for self-employed persons without income from wages. Although workers without wages are not affected by the minimum wage increase, TRIM3 requires an estimate of actual weeks of work for all workers to convert annual income amounts to the monthly income amounts required for the simulation (see appendix B for further details).

References

Aaronson, Daniel, Eric French, and James MacDonald. 2008. "The Minimum Wage, Restaurant Prices, and Labor Market Structure." *Journal of Human Resources* 43 (3): 688–720.

Addison, John T., McKinley L. Blackburn, and Chad D. Cotti. 2012. "The Effect of Minimum Wages on Labour Market Outcomes: County-Level Estimates from the Restaurant-and-Bar Sector." *British Journal of Industrial Relations* 50 (3): 412–35.

———. 2013. "Minimum Wage Increases in a Recessionary Environment." *Labour Economics* 23 (1): 412–35.

Albelda, Randy, and Heather Boushey, with Elizabeth Chimienti, Rebecca Ray, and Ben Zipperer. 2007. *Bridging the Gaps: A Picture of How Work Supports Work in Ten States*. Washington, DC: Center for Economic and Policy Research.

Allegretto, Sylvia A., Arindrajit Dube, and Michael Reich. 2011. "Do Minimum Wages Really Reduce Teen Employment? Accounting for Heterogeneity and Selectivity in State Panel Data." *Industrial Relations* 50 (2): 205–40.

Allegretto, Sylvia, Marc Doussard, Dave Graham-Squire, Ken Jacobs, Dan Thompson, and Jeremy Thompson. 2013. *Fast Food, Poverty Wages: The Public Cost of Low-Wage Jobs in the Fast-Food Industry*. Berkeley, CA: University of California and University of Illinois at Urbana-Champaign.

Akerlof, George A. 1982. "Labor Contracts as Partial Gift Exchange." *The Quarterly Journal of Economics* 97 (4): 543–69.

Belman, Dale, and Paul Wolfson. Forthcoming. *What Does the Minimum Wage Do?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Bernstein, Jared. 2004. "The Low-Wage Labor Market: Trends and Policy Implications." in *Work-Family Challenges for Low-Income Parents and Their Children*, eds. Alan Booth and Ann C. Crouter (New Jersey: Lawrence Erlbaum Associates, Inc.), 3–34.

Berube, Alan. 2014. *All Cities Are Not Created Unequal*. Washington, DC: Brookings Institution.

Borjas, George J. 2005. *Labor Economics*. 3rd ed. New York: McGraw-Hill.

Card, David, and Alan B. Krueger. 1995. *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, NJ: Princeton University Press.

Castillo-Freeman, Alida J., and Richard B. Freeman. 1992. "When the Minimum Wage Really Bites: The Effect of the US-Level Minimum on Puerto Rico." In *Immigration and the Work Force: Economic Consequences for the United States and Source Areas*, edited by George J. Borjas and Richard B. Freeman, 177–211 (Chicago: University of Chicago Press).

CBO [Congressional Budget Office]. 2014. "The Effects of a Minimum-Wage Increase on Employment and Family Income." Washington, DC: Congress of the United States Congressional Budget Office.

Coomer, Nicole M., and Walter J. Wessels. 2012. "The Effect of the Minimum Wage on Covered Teenage Employment." *Journal of Labor Research* 34 (3): 253-280.

Cooper, David. 2013. *Raising the Federal Minimum Wage to $10.10 Would Life Wages and Provide a Modest Economic Boost*. Washington, DC: Economic Policy Institute.

Danziger, Leif. 2009. "The Elasticity of Labor Demand and the Minimum Wage." *Journal of Population Economics* 22 (3): 757–72.

Danziger, Leif. 2010. "Endogenous Monopsony and the Perverse Effect of the Minimum Wage in Small Firms." *Labour Economics* 17 (1): 224–29.

DC Action for Children. 2011. "D.C. Rolls Out 5-Year TANF Time Limit." Washington, DC: DC Action for Children and District of Columbia Department of Human Service.

DC Fiscal Policy Institute. 2010. "What's in the FY 2011 Budget for Early Care and Education?" Washington, DC: Center on Budget Policy and Priorities.

DeFina, Robert H. 2008. "The Impact of State Minimum Wages on Child Poverty in Female-Headed Families." *Journal of Poverty* 12 (2): 155–74.

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux. 1996. "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach." *Econometrica* 64 (5): 1001–44.

Doucouliagos, Hristos, and Tom D. Stanley. 2009. "Publication Selection Bias in Minimum-Wage Research? A Meta-Regression Analysis." *British Journal of Industrial Relations* 47 (2): 406–28.

Douglas, Paul H., and Joseph Hackman. 1939. "The Fair Labor Standards Act of 1938 II." *Political Science Quarterly* 54 (1): 29–55.

Dube, Arindrajit. 2013. *Minimum Wages and the Distribution of Family Incomes*. Amherst: University of Massachusetts.

Dube, Arindrajit, T. William Lester, and Michael Reich. 2010. "Minimum Wage Effects across State Borders: Estimates Using Contiguous Counties." *The Review of Economics and Statistics* 92 (4): 945–64.

———. 2012. *Minimum Wage Shocks, Employment Flows and Labor Market Frictions*. Berkeley: Institute for Research on Labor and Employment.

Eslami, Esa, and Karen Cunnyngham. 2014. "Supplemental Nutrition Assistance Program Participation Rates: Fiscal Years 2010 and 2011." Washington, DC: Mathematica Policy Research.

Formby, John P., John A. Bishop, and Hoseong Kim. 2010. "The Redistributive Effects and Cost-Effectiveness of Increasing the Federal Minimum Wage." *Public Finance Review* 38 (5): 585-618.

Freeman, Richard B. 1996. "The Minimum Wage as a Redistributive Tool." *Economic Journal* 106 (436): 639–49.

Georgiadis, Andreas. 2013. "Efficiency Wages and the Economic Effects of the Minimum Wage: Evidence from a Low-Wage Labour Market." *Oxford Bulletin of Economics and Statistics* 75 (6): 962–79.

Giannarelli, Linda, Kye Lippold, and Michael Martinez-Schiferl. 2012. *Reducing Poverty in Wisconsin: Analysis of the Community Advocates Public Policy Institute Policy Package*. Washington, DC: Urban Institute. http://www.urban.org/publications/412604.html.

Giannarelli, Linda, Joyce Morton, and Laura Wheaton. 2007. *Estimating the Anti-Poverty Effects of Changes in Taxes and Benefits with the TRIM3 Microsimulation Model*. Washington, DC: Urban Institute. http://www.urban.org/publications/411450.html.

Giuliano, Laura. 2013. "Minimum Wage Effects on Employment, Substitution, and the Teenage Labor Supply: Evidence from Personnel Data." *Journal of Labor Economics* 31 (1): 155–94.

Hirano, Keisuke, Guido W. Imbens, and Geert Ridder. 2003. "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score." *Econometrica* 71 (4): 1161–90.

Hirsch, Barry T., Bruce E. Kaufman, and Tetyana Zelenska. 2011. *Minimum Wage Channels of Adjustment*. No. 6132. Discussion Paper series, Bonn, Germany: Institute for the Study of Labor.

Kaufman, Bruce E. 2010. "Institutional Economics and the Minimum Wage: Broadening the Theoretical and Policy Debate." *Industrial and Labor Relations Review* 63 (3): 427–53.

Leigh, Andrew Keith. 2010. "Who Benefits from the Earned Income Tax Credit? Incidence among Recipients, Coworkers and Firms." *B.E. Journal of Economic Analysis & Policy* 10 (1): 1–43.

Levitis, Jason A., and Nicholas Johnson. 2006. *Together, State Minimum Wages and State Earned Income Tax Credits Make Work Pay*. Washington, DC: Center on Budget and Policy Priorities.

Maag, Elaine. 2006. "Tax Credits, the Minimum Wage, and Inflation." *Tax Policy Issues and Options*. 17: 1–9. Washington, DC: Urban-Brookings Tax Policy Center.

Martinez-Schiferl, Michael, Sheila R. Zedlewski, and Linda Giannareli. 2011. *Reports of Unemployment Compensation in the American Community Survey*. Washington, DC: Urban Institute. http://www.urban.org/publications/412323.html.

Meer, Jonathan, and Jeremy West. 2013. *Effects of the Minimum Wage on Employment Dynamics*. No. w19262. National Bureau of Economic Research.

NELP [National Employment Law Project]. 2013. "Super-Sizing Public Costs: How Low Wages at Top Fast-Food Chains Leave Tax Payers Footing the Bill." New York: National Employment Law Project.

Neumark, David, David Lamoreaux, and Abby Clay Turner. 2013. "The Economic Impacts on the District of Columbia of Various Legislative Proposals to Change the Minimum Wage." Washington, DC: Charles River Associates.

Neumark, David, and William L. Wascher. 1992. "Employment Effects of Minimum and Subminimum Wage: Panel Data on State Minimum Wage Laws." *Industrial and Labor Relations Review* 46 (1): 55–81.

———. 2006. *Minimum Wages and Employment: A Review of Evidence from the New Minimum Wage Research*. Working Paper w12663. Cambridge MA, National Bureau of Economic Research.

———. 2008. *Minimum Wages*. Cambridge, MA: MIT Press.

———. 2011. "Does a Higher Minimum Wage Enhance the Effectiveness of the Earned Income Tax Credit?" *Industrial and Labor Relations Review* 64 (4): 712–46.

Orrenius, Pia M., and Madeline Zavodny. 2008. "The Effect of Minimum Wages on Immigrants' Employment and Earnings." *Industrial and Labor Relations Review* 61 (4): 544–63.

Passel, Jeffery S., Jennifer Van Hook, and Frank D. Bean. 2004. *Estimates of the Legal and Unauthorized Foreign-born Population for the United States and Selected States, Based on Census 2000*. Alexandria, VA: The Council of Professional Associations on Federal Statistics.

Reich, Michael, Ken Jacobs, and Miranda Dietz, eds. 2014. *When Mandates Work: Raising Labor Standards at the Local Level*. Berkeley, CA: University of California Press.

Rothstein, Jesse. 2008. *The Unintended Consequences of Encouraging Work: Tax Incidence and the EITC*. Princeton, NJ: Center for Economic Policy Studies.

Sabia, Joseph J. 2008. "Minimum Wages and the Economic Well-Being of Single Mothers." *Journal of Policy Analysis and Management* 27 (4): 848–66.

Sabia, Joseph J., and Richard V. Burkhauser . 2010. "Minimum Wages and Poverty: Will a $9.50 Federal Minimum Wage Really Help the Working Poor?" *Southern Economic Journal* 76 (3): 592–623.

Sabia, Joseph J., Richard V. Burkhauser, and Benjamin Hansen. 2012. "Are the Effects of Minimum Wage Increases Always Small? New Evidence from a Case Study of New York State." *Industrial and Labor Relations Review* 65 (2): 350–76.

Sabia, Joseph J., and Robert B. Nielsen. 2013. "Minimum Wages, Poverty, and Material Hardship: New Evidence from the SIPP." *Review of Economics of the Household*.

Safety Net Almanac. 2014. Urban Institute. http://www.urban.org/safety-net-almanac/

Sawhill, Isabel, and Quentin Karpilow. 2014. *Raising the Minimum Wage and Redesigning the EITC*. Washington, DC: Brookings Institution.

Schmitt, John. 2013. *Why Does the Minimum Wage Have No Discernible Effect on Employment?* Washington, DC: Center for Economic and Policy Research.

Schmitt, John, and David Rosnick. 2011. *The Wage and Employment Impact of Minimum-Wage Laws in Three Cities*. Washington, DC: Center for Economic and Policy Research.

Social Security Administration. 2014. *Annual Statistical Supplement to the Social Security Bulletin, 2013*. SSA Publication No. 13-11700. Washington, DC: Social Security Administration.

West, Rachel, and Michael Reich. 2014. *The Effects of Minimum Wages on SNAP Enrollments and Expenditures*. Washington, DC: Center for American Progress.