Earnings, EITC, and Employment Responses to a $15 Minimum Wage: Will Low-Income Workers Be Better Off?

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Abstract

This study assesses the economic and fiscal impacts of the Fair Shot Minimum Wage Amendment Act of 2016, which increases the District of Columbia minimum wage to $15 an hour. This minimum wage policy coupled with the city's 40 percent local EITC supplement, as a package, represent one of the most aggressive labor-market policy interventions in the nation. This study estimates the short and long-term earnings, employment and EITC responses to these policies. While many minimum wage studies have relied on partial-equilibrium approaches that focus on specific subsets of the workforce (e.g. teens, restaurant workers), our study uses a computable general equilibrium (CGE) model for the city's entire workforce. We supplement the CGE results with a policy microsimulation model using administrative tax data. We estimate that over 60,000 District residents will be impacted by these policies and will observe a total increase of about $192 million in wage income (about 19 percent), while about 2 percent of District resident workers will experience job loss. We also find that the city's EITC recipients will lose a total of $16.4 million in federal and local EITC payments in 2021 while gaining $56.6 million in additional wages by way of the $15 minimum wage.

I. Introduction

In recent years, state and local governments and their citizens have vocalized concerns surrounding stagnant wages, rising inequality, and overall socio-economic well-being among low and moderate-income residents. In response, many localities moved to enact minimum wage increases well-beyond the federally mandated level of $7.25 per hour. The Washington, D.C. Fair Shot Minimum Wage Amendment Act of 2016 stands out as among the most expansive of these, increasing the city's hourly minimum wage to $15 by 2020. The increase occurs over a 4-year period following an era of local economic expansion and historically strong financial health (Gandhi, Spaulding, and McDonald 2015). Meanwhile, beginning in the early 2000s, the city created and gradually expanded a refundable earned income tax credit (EITC) for working-poor residents. The local EITC and minimum wage policies, as a package, represent one of the most aggressive labor-market policy interventions in the nation. Nonetheless, there is limited research surrounding the potential consequences of these joint policies for the low and moderate-income workers they are meant to assist.

In this study, we use a computable general equilibrium (CGE) model to estimate how the local and regional economies, in the short-run and long-run, respond to the city's $15 Minimum Wage Policy ($15 MWP). We also use a tax policy micro simulation model to estimate how federal and local earned income tax credit (EITC) levels respond to the higher $15 MWP. While this increase in the minimum wage impacts nearly everyone within the local and regional economy, this analysis focuses on city residents who will be directly impacted by the higher wages, which we define as those earning an hourly wage of $18 an hour or less in 2017.

We find that almost 61,000 city residents will be impacted annually by this policy; these residents will, on average, gain over $3,100 more in additional income (16.5 percent higher) in 2021 versus without the policy. Approximately 2 percent of impacted city residents are predicted to experience job loss, and this job loss estimate increases to about 3.4 percent by 2026. We also find that over 63 percent of working city residents who are likely to be affected by the higher minimum wage will be EITC recipients. While nearly all are forecasted to experience reductions in their federal and local EITC payments, the higher income from the $15 MWP for these workers will more than offset their loss in EITC income. The $15 MWP could therefore shift some income and safety-net related costs—specifically those deriving from the refundable EITC—from the public sector to the private sector.

Section two of the paper will contain a review of the minimum wage literature, and section three will discuss the motivation and appropriateness of using a CGE model for this study given that most minimum wage studies use a partial equilibrium approach. Section four presents the data and methodology used, and section five presents the results. The final section of this study offers policy conclusions and summarizes how CGE and other policy simulation models can complement ex-poste partial equilibrium analyses, by providing more comprehensive insights and findings concerning large policy changes prior to policy implementation.

II. Background on Minimum Wage Research

Critics of local minimum wages argue that such policies are poorly targeted at raising incomes among the working poor (Sabia 2014), and in many instances, favor some combination of human capital development, refundable Earned Income Tax Credits (EITC), or direct income transfers (e.g. Neumark 2004). They also argue that subgroups with already low employment levels and labor force attachment could be harmed by policies that raise, not lower, hiring and labor costs (Holzer 2013). On the other hand, some scholars point to evidence that minimum wages raise earnings and, subsequently, overall family incomes, with minimal negative employment effects (e.g. Bernstein and Shierholz 2014). Nationally, there is mixed evidence on the overall economic and employment effects of minimum wages, and most impact studies on minimum wages focus on employment effects. Neoclassical economic theory predicts that minimum wage policies setting wages above the local market equilibrium can result in unemployment in at least two ways. First, higher wages increase the labor supply, but some of these new entrants may fail in their search. Second, firms may have a “demand” or need for additional workers, but their hourly contribution to productivity may be below the mandated minimum wage. Studies finding unemployment consequences include Neumark and Wascher (2007) and Sabia et al. (2012).

Other empirical studies (e.g. Card & Kruger 1994; Dube et al. 2010) finding little or no significant negative employment impacts from minimum wages have economic theoretical support as well; efficiency wage theory posits that workers respond positively to higher compensation and raise their own productivity, and that turnover costs are reduced as well. Quantitatively, the employment effects of higher minimum wage studies are measured by their employment elasticities. The major studies we evaluated found employment elasticities ranging from -0.20 to +0.10 (-20 percent to +10 percent). Neumark and Wascher (2007) found employment elasticities in the range of -0.1 to -0.2 for teens and -0.15 to -0.2 for the youth population as a whole. Sabia et al (2012) found elasticities of -0.13 for workers with a high school diploma while finding that workers with a bachelor’s degree had an employment elasticity of +0.10 with respect to the minimum wage, whereas Dube et al. (2010), Card and

Krueger (2000) and Addison et al. (2014) found elasticities near zero for restaurant and fast food workers.

Recent work by Jardim et al. (2017) provides new evidence on a similar minimum wage expansion in Seattle, WA. They find mixed results from the city's expansion from roughly $9.50 to $13; namely, that earnings do indeed fall—an hours-worked effect—while employment is unchanged. To our knowledge, only a few DC-focused minimum wage studies exist, and they focus on the older $11.50 MWP. For example, partial equilibrium analyses by Nichols and Schwabish (2014) and Acs et al. (2014) modeled DC minimum wage changes in comparison to surrounding counties—similar with respect to demographic characteristics but without the policy change—finding little-to-no evidence of lowered employment.

It is worth noting that our study is one of a group using a general equilibrium micro simulation approach to estimate the impact of a higher minimum wage within a local labor market. For example, Reich et al. (2015) use the IMPLAN model, and find minimal employment consequences from higher minimum wages in Los Angeles, CA. Additionally, ours is among the few studies that compare and assess the impact of the minimum wage on EITC participation and expenditures (Neumark & Wascher 2001). This is especially relevant for DC, which currently provides the nation's largest local supplement to the federal EITC for working residents—40 percent of federal EITC received.

III. Estimating the Effects of a $15 MWP: The Strengths of a CGE Model

Between 2014 and 2016, when the District of Columbia gradually increased its minimum wage from $8.25 to $11.50 ($11.50 MWP), city leaders also began debating whether to implement a $15 MWP. For context, in 2014 no city or state in the country had yet legislated such a policy, and the proposed $15 MWP would have made DC the first in the nation to reach the $15 wage floor by 2020.

Several members of the City Council were inclined to pass a $15 MWP into law, but key questions first needed to be addressed. First, what would be the order of magnitude for the estimated job losses under the new proposal? Second, to what extent would this policy disadvantage city businesses relative to their competitors in neighboring jurisdictions of Maryland and Virginia? Third, with the goal of assisting working low-wage city residents, how would this policy affect the EITCs for these same workers?

These questions underscore the concern that, while well-intentioned, the proposed $15 MWP represents a major business and labor policy change with the potential to positively or negatively impact a number of city industries, sectors, and markets. Nearly all previous minimum wage studies analyzed policies that increased minimum wages by a relatively small dollar amount, approximately $1 to $2. Those studies also tended to conduct ex-poste evaluations on what occurred as a result of minimum wage increases, versus what *could* occur in the future.

Though the District of Columbia was already increasing its minimum wage by $3.25 between years 2014 and 2016, administrative employment, wage, and tax data for the city was not yet available for analysis of the city's existing $11.50 MWP, let alone an analysis of the impending $15 MWP. Given this sizable change, as well as the 2020 implementation date and the potential wide-range of economic implications, we use a computable general equilibrium (CGE) model to estimating the future short and long run responses of the $15 MWP.

CGE models reproduce the structure of an entire economy via a system of mathematical equations. The objective of the model's construction is to portray and characterize the nature of all existing economic transactions and interrelationships in a realistic manner, using detailed economic data. All the model equations are derived directly from economic theory and are solved simultaneously to find economy-wide equilibria in which, for some set of prices, the quantities of supply and demand are equal in every market. The underlying economic data details the entire circular flow of income and spending in the economy during the last full year in which data is available. The data, described in greater detail below, provides values of all exogenous variables, parameters and the initial equilibrium values of all endogenous variables. The model also relies on elasticity parameters which describe the producer and consumer responses to changes in prices and income (Burfisher, 2016).

CGE models are most useful when the goal is to systematically analyze the numerous economic effects of substantive policy changes or economic shocks in a theoretically consistent way. This is especially true when policy changes are large, complex, materializing through different transmission channels, and are expected to be implemented gradually over time. The models are far from ideal for forecasting specific point estimates over one or two select economic variables. Rather, a CGE model allows for the examination of specific effects of interest in the context of an array of other estimated effects. Additionally, these models have the ability to relatively precisely identify the winners and losers of a policy change or economic shock.

Some CGE models solve for one time period and assume behavior depends only on the present and the past. For these models, the adjustment process is not explicitly represented in the model. However, other models attempt to incorporate reciprocal causation or behavioral feedback loops of economic agents that derive from an adjustment process and the future state of the economy itself. This class of CGE models, dynamic general equilibrium models, traces each economic variable through time, distinguishing between short-run equilibrium and long-run equilibrium, and solving for future time periods simultaneously.

Despite the wide use of CGE models across the public and private sector to help inform policy analysis and decision-making, these are often used by governmental public policy units. Additionally, model results often cannot be precisely and clearly traced to unique features of their data bases, input parameters, or algebraic structure (Wing 2003). While these models do come with some built-in rigidity, these models are not "black boxes" from which results are disconnected to a significant degree from the underlying data and/or from the governing theoretical framework[1]. Ultimately, the models are premised on the circular flow of the economy, with pre-programmed elasticities, and are based on the logic and rules of social accounting matrices.

Consequently, empirical results derived from CGE models are useful as one tool towards conducting economic policy analysis.[2] These CGE models, like other economic models, are not without weaknesses and imperfections, such that they can complement other economic models and sources of information. Relative to a partial-equilibrium model, CGE models can identify,

[1] The relatively consistent non-transparency by many CGE model builders concerning the mechanics and technical inner workings of such models (particularly the dynamic CGE models) help to fuel gratuitous criticisms of CGE models by economists who have a strong preference of evaluating a model's estimates via their standard errors and confidence intervals. CGE model builders might begin to assuage some of the justified criticisms by, at a minimum, revealing all elasticity values used in their model and how these values are derived. (Mitra-Kahn, 2008)

[2] Prominent CGE models have been built, maintained and utilized in organizations and institutions such as at the U.S. International Trade Commission, the Economic Research Service of the U.S. Department of Agriculture, and the World Bank. Some CGE models factored heavily in the debate about NAFTA, the Kyoto Protocol, and the Trans-Pacific Partnership. (Burfisher, 2016) The Patient Protection and Affordable Care Act was also analyzed via a CGE model. (Ciaschini, Pretaroli and Socci, 2014)

quantify and assess economy-wide economic responses—major and minor—to a particularly large shock or policy change. On the other hand, partial equilibrium models assume, beyond the two or more markets under investigation, all other incomes and prices in the rest of the economy are fixed. Realistically, such factors change jointly, thus making CGE well-suited for this analysis.

IV. Data & Methodology

Employment Data

To estimate the number and distribution, by industry, of low wage jobs impacted by the $15 MWP, we begin by using Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES) survey data and the U.S. Census Bureau's American Community Survey (ACS). The OES program produces employment and wage estimates (hourly and annual) for over 800 occupations at both the national and metropolitan level,[3] while the ACS provides information on place of work and state of residency.

We identify, within the roughly 800 work occupations in the District, the number of jobs that are likely impacted from raising the minimum wage to $15 an hour. We estimate that, in 2014, 127,299 jobs in DC pay $15 per hour or less, accounting for about 18.8 percent of the District's overall employment base.[4]

Studies have shown that employers typically increase the wages of workers earning slightly above a new, higher minimum wage to reduce wage compression (Lopresti et. al 2015;

[3] Data used in our study are from the OES May 2014 estimates for DC, when the DC minimum wage was $8.25.
[4] The OES data includes all part-time and full-time workers who are paid a wage or salary, but does not cover self-employed workers, sole proprietors, household workers, or unpaid family workers.
http://www.bls.gov/oes/oes_ques.htm#overview

Dube 2013). We therefore include jobs with wages slightly above the new $15 minimum hourly wage rate to allow for these "spillover effects" of minimum wage hikes. We allow for a $3 spillover effect, which arguably helps maintain within-firm wage differentials commensurate with differences in factors such as experience, seniority, educational attainment, and productivity. The distribution of the 167,419 city jobs impacted by the $15 MWP are shown in Table 1, according to their 2-digit Standard Occupational Classification (SOC) occupations.[5]

Wage and Salary Data by Industry

Since the data used within the CGE model is at the industry level, and not occupation, the occupational impacts from Table 1 are converted to comparable industry impacts using the National Industry-Occupation Employment Matrix.[6] Using the matrix, we estimate the 2014 total wages for every job with an estimated hourly wage of no more than $18 in terms of the seventy-one (71) 3-digit NAICS industries. Figure 1 shows the distribution of higher minimum wages in the city in 2014 across industries. The figure shows that commercial retail, healthcare & social assistance, other services, and the accommodation & food service industries are expected to be most impacted. These four industries are estimated to account for over 70 percent of the total impact.

We estimate the total wages for this same worker population for both the $11.50 MWP (baseline) and the $15 MWP (policy simulation) annually until year 2020, finding that the cumulative difference in total wages and salaries in the city as of 2020 is $493.2 million, an

[5] We also calculated the wage distribution for ninety-five (95) 3-digit SOC occupations used this more precise distribution as an input into the CGE.
[6] The National Industry-Occupation Employment Matrix is developed by BLS and depicts the occupational employment structure of different industries. For each industry, it provides the percentage of total employment accounted for by each detailed occupation.

approximately one percent increase in city's wage and salaries (Table 2). Year 2020 is the year the city achieves the statutory $15 minimum wage, but our short-term results will focus on year 2021, one year after full implementation of the policy.

Based on ACS data, DC residents held approximately 40 percent of the jobs where the hourly wage was $18 or below within the city limits. The remainder were held by non-D.C. residents, largely from the neighboring states of Maryland and Virginia. Table 3 shows the estimated total number of jobs in the city and the total number of jobs held by city residents affected by the $15 MWP, where 40 percent of each range represents the jobs held by city residents. We thus assume that city-residents are distributed relatively evenly across the low-wage employment market.

The above analyses allow us to quantify one of the two primary policy shocks to be used in the CGE model. On the household income side, we introduce gradual annual positive shocks for years beginning in 2017 culminating into a $493 million shock to city total income in 2020. This represents the estimated additional wage and salary income resulting from the $15 MWP for the 167,419 city jobs that paying $18 per hour or less in 2017. On the production side of the economy, we introduce gradual annual negative shocks for years beginning in 2017 and culminating into a $528 million shock ($493 in higher wage and salaries plus 7 percent for social security taxes) to labor costs for city businesses in 2020.

The CGE Model

The CGE model used in this analysis is the REMI PI+[7]. It models the regional economy of the District of Columbia and six surrounding metropolitan areas (MSA) and their seventy-one (71) 3-digit NAICS industries. The model solves for general equilibrium in every market via price adjustments in the regional economy annually while simultaneously modeling behavioral changes (i.e. labor supply, migration, commuting patterns) over a longer time period in response to the initial policy shock. Our REMI model is customized to the DC regional economy using various area specific time series data and local coefficients (i.e. labor productivity parameters and housing price elasticities), which makes response patterns to any shock in our model differ from models calibrated for other regions (Treyz and Stevens, 1985). Using four major approaches to economic analysis: an input-output matrix, econometric modeling (for parameter estimation), economic geography, and general equilibrium analysis, the model allows for annual short-term policy responses even while the regional economy's consumers and producers gradually readjust to the long-run equilibrium.

Starting from an initial steady state of the District of Columbia economy in 2017 where supply and demand are balanced, annual increases in earned income by city workers and annual increases in labor costs by city businesses for years 2017 to 2020 are the two primary exogenous shocks entered into the model. These shocks initially create disequilibrium in the District's existing economic relationships, but as the economy gradually moves to regain equilibrium over time, the model catalogues annual changes to the region's general equilibrium basis while simultaneously modeling changing consumer and business behavior over a longer time. These

[7] http://www.remi.com/resources/documentation. REMI, in contrast to input-output models such as IMPLAN and RIMS II, allows for changes in relative factor costs such as changes in wages or the cost of capital. If these econometric responses and dynamics are suppressed, then REMI becomes more similar to traditional input-output type models.

dynamics involve changes in employment, income, consumption, prices, and trade flows in and out of the city to neighboring states. These dynamic interdependencies are summarized in five major sets of economic measures: (1) Output and Demand, (2) Labor and Capital Demand, (3) Population and Labor Supply, (4) Compensation, Prices, and Costs, and (5) Market Shares[8].

Of these 5 major groups, the Labor and Capital Demand component is fundamental to this study. The use of labor relative to other factors is determined by the cost of labor relative to the cost of other factors such as capital and fuel. In the model, the substitution between labor, capital and fuel is based on a Cobb-Douglas production function, a standard microeconomic approach accounting for the interplay of capital (e.g. operating space, computer equipment, work-related tools) and labor (e.g. workers) in driving overall production and revenue. As the cost of labor increases when the District raises the minimum wage, demand for labor (with other factors being constant) is assumed to fall according to standard economic theory. In the model, changes in labor demand are controlled by industry specific labor intensities. The substitutions between capital and labor are derived from empirical studies which consider wages and commuting patterns (Weisbrod, Vary, Treys 2001). And, with respect to the city's economy in particular, Figure 1 indicates that commercial retail, healthcare and social assistance, other services, and the accommodation and food service industries are expected to be most impacted. Our short-term results are for 2021, one year after full implementation of the policy in 2020. Our long-term results are for 2026, five years thereafter.

[8] REMI Inc. 2014

Scenarios

In the context of a CGE model, the District government's $15 MWP represents an exogenous shock to the DC economy. The estimated economic impacts are influenced by the aforementioned assumptions we made about the policy shocks. To assess the sensitivity of the results to our assumptions, we produce five forecast scenarios for the $15 MWP, each having unique underlying assumptions. Our study simulates the effects of each scenario under the new minimum wage policy relative to the baseline $11.50 MWP.

The first scenario represents only the workers earning below $15 in 2017 an hour and is deemed the "base case" and assumes no offsetting effects for businesses. The second scenario builds on the base case by factoring in spillover effects such that the affected minimum wage subpopulation now includes workers earning below $18 an hour and is deemed the "worst case." The third scenario factors in productivity gains. This scenario builds on the second scenario by taking into account increases in worker productivity and reduced labor recruiting and retention costs associated with higher wages. Several economic studies (Boushey and Jane-Glynn 2012; Cascio 2006; Dube et al. 2007; Howes 2005; Reich et al. 1999) show that raising wages reduce costly employee turnover and increases productivity, and these factors can significantly offset higher payroll costs for businesses. We calculate that these savings account for a roughly 30 percent reduction in the business costs otherwise observed with the wage increase based on the results of these studies[9].

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[9] A 30% cost saving is based on several studies on how higher wage rates impact turnover and productivities. Fairris (2005) studied the effect of 1997 Los Angeles living wage policy (wage increase of about $.78 or $1.9 per hour depending on whether insurance is provided, average increase of about 15%) on workers turnover rate and found that turnover reductions represent 16 percent of the cost of the wage increase for the average firm. Mas

Our CGE model employs a "representative consumer" in analyzing consumption and savings patterns. However, since the subject of our study are minimum wage workers, we impose an additional assumption to reflect the difference in their tax paying and consumption patterns; specifically, that minimum wage workers pay much lower federal and state tax rates on additional wage income than a typical worker does, and that they will spend nearly all of their additional after-tax income on consumption[10]. The higher marginal propensity to consume for minimum wage workers in turn increases demand and mitigates some level of job loss (Fisher, Johnson, and Smeeding 2014). Our fourth scenario factors in this increased amount of consumption and is deemed the "most likely case". Our fifth and final scenario takes all of the assumptions from the fourth scenario but increases the productivity gains from 30 percent to 75 percent, representing an efficiency wage.[11] This fifth scenario is deemed the" best case." Table 4 summarizes these five scenarios.

In our view, we consider Scenario 2 as the worst case because it has the highest labor cost increases with no offsetting economic gains from the policy. We consider Scenario 5 as the optimistically best case. This scenario assumes the minimum wage workers will consume nearly all of their additional income increases, workers raise their own productivity, and that turnover costs are considerably reduced, with employers harnessing other operational and technological efficiencies. The increases in net labor costs due to $15 MWP in scenario 5 are minimal, approximately 20 percent of Scenario 2's labor cost. We deem Scenario 4 as the most likely out

(2006) analyzed the case of New Jersey police officers who were granted a wage increase of 17 percent, and found that they were 12 percent more productive in clearing cases than those who were refused the increase.

[10] In our simulation using DC income tax data, we found that a minimum wage worker in DC would pay a combined 15 percent federal and state marginal tax rate on their additional income, while the combined marginal tax rate for a typical DC consumer is about 33 percent. The savings rate difference is about 5 percent.

[11] The 75 percent assumption is used to produce non-negative effect on employment to match many similar findings in Dube et al. more need to add here.

of the five scenarios because the $15 MWP could reasonably impact some workers earning more than $15 an hour, prior literature suggests there will be some productivity and operational/ technological efficiency gains, and the lowest earning workers should have a higher propensity to consume all or at least substantially more of their income than the average worker in the city. We, on the other hand, do not believe that 75 percent of the additional labor costs will be offset by productivity and operational/technological efficiency gains—nor the consequent null employment effects. Thus, unless stated otherwise, the reported results are based upon Scenario 4.

V. The Relationship Between the $15 MWP and the Safety Net

The purpose of the District of Columbia's $15 MWP is to help the city's lowest wage-earning residents earn higher income, while also offsetting the rapidly increasing cost of living (Gould et al. 2015)[12]. Other social welfare programs exist to help many of these same city resident workers, including Medicaid and the State Children's Health Insurance Program (CHIP), the EITC, Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), federal and local Housing Choice Voucher Programs, and Low-Income Home Energy Assistance Program (LIHEAP).

To better understand the interaction between higher minimum wages and existing public programs, we examine the link between the $15 MWP and the EITC using micro-level administrative EITC data. Specifically, we quantify the net effect as well as the distributional effect of the overlap of these policies now using a tax policy micro simulation model. The EITC

[12] Gould, Elise, Tanyell Cooke and Will Kimball. 2015. What Families Need To Get By: EPI's 2015 Family Budget Calculator. Economic Policy Institute

is currently the nation's largest federal cash transfer program for low- and moderate-income working families, and the DC EITC, equal to 40 percent of the Federal EITC, is the largest state or local supplement to the federal EITC in the country. More important, it is a work-based safety net support—refunds subsidize earned income.[13] For this reason, it is directly related to minimum wage policy.

An Earned Income Tax Policy Simulation Model

To address this unique but very important aspect of the city's economy and public policy environment, we compliment the CGE analysis with the use of the District of Columbia Individual Income Tax & EITC Policy Micro Simulation Model (IEM). Ultimately, the IEM simulates the impact of the $15 MWP on the total federal and local EITC received in the city in year 2021 as well as the total citywide income change due to this policy (as an alternative to the CGE produced estimate) also in 2021, one year after full implementation of the policy in 2020.

The IEM is a comparative static model that estimates the incomes, federal and local earned income tax credit payments, and city income tax liabilities of directly affected working residents in year 2021 both with and without the $15 MWP. The model draws upon administrative individual income tax return data for each income tax filer in the District of Columbia. And, whereas the CGE model produces results in terms of jobs, the IEM produces results in terms of tax filers units (i.e. resident income earners that file city income tax returns). The former model estimates that the $15 MWP will affect 66,968 jobs in the city held by residents. We assume that for the population of the city's lowest wage workers, there will be more than a few workers holding more than one job; in our model, this population of workers

[13]Hardy, Muhammad & Samudra (2015)

will hold, on average, 1.10 jobs. Consequently, there will be 60,748[14] income-earning city residents directly affected by this policy change, and we report the results of our simulation on the $15 MWP and the EITC in section VI.

Income Tax Data

At the outset, there were over 350,000 District of Columbia residents that filed under the District of Columbia Individual Income Tax. Individual income tax returns used in the policy simulation model were limited to 12-month residents with annual wage earnings between $3,000 and $32,000.[15] Under these criteria, there are 93,462 relevant tax filing records for working District residents. From this population, we randomly select 60,748 filers (per the initial estimate of affected residents from the BLS data) to represent tax-filing District residents working in the city between 2014 and 2021 who are directly impacted by the $15 MWP.[16] We estimate the annual total wages for each worker/tax filer in this population for both the $11.50 MWP (baseline) and the $15 MWP (policy simulation) annually until year 2021.

VI. Results

Employment Impacts

The CGE model produces employment impacts based on the five simulated policy scenarios. In 2021 the model estimates, for scenario 1, that 1,347 city residents will become

[14] 66,968/1.1024=60,748

[15] It was assumed that filers with earnings less than $3,000 had extremely low annual income primarily because of the very few number of hours worked during the year and not because of low hourly wages. At the other end of the spectrum, the maximum annual wage income amount considered in this analysis for 2014 is $32,000, which is the estimated annual income for full time workers working at an average hourly wage rate of $18 per hour. While it is expected that nearly all workers at hourly wages between $11.50 and $15 in 2014 will see the largest increases in their annual earnings from the $15 MWP, this policy is also expected to cause a significant number of workers earning between $15 and $18 in 2014 to experience nontrivial increases in their annual earnings.

[16] Income tax records do not indicate tax filers' place of work or occupation.

unemployed because of the $15 MWP (Figure 2). For Scenario 2, the level of the resident unemployed increase to 1,680, and for Scenario 3 the unemployment estimate falls to 1,160. Scenario 4 further lowers the level of job loss to 1,074. Finally, for Scenario 5, the $15 minimum wage is treated as an efficiency wage, resulting in only 109 additional unemployed residents in 2021. As we move past scenarios 1 and 2, the job loss responses lessen as behavioral responses offset some of the higher labor costs.

The results inform us that, even if job loss is lower from one scenario to another, higher labor costs produce adverse consequences for the city's economy. City businesses absorbing higher labor costs may, in turn, raise prices. This could render them less competitive with respect to prices in comparison to nearby competitors in the neighboring counties of Maryland and Virginia, many which border the District and have lower minimum wages. We find that, on average, prices are expected to rise 0.2% above baseline levels in 2021 for all goods and services sold in the city, with the highest increase occurring in the food service and restaurant sector with an expected average increase of almost 1.5% higher than the baseline in 2021. These price increases impact every consumer in the city, and are the primary driver for the forecasted loss of business competitiveness among DC businesses relative to their Virginia and Maryland counterparts.

This result becomes apparent in Figure 3, which shows that the city's gross state product falls under all five scenarios. The model indicates the principal driver of this to be higher prices, causing many consumers that would otherwise purchase some goods in services in the city to now do so from Maryland and Virginia businesses, if at all. That is, city businesses exports less to consumers in the regional economy and city residents import more than prior to the new policy.

Minimum wage partial equilibrium analyses typically provide explicit employment elasticities generated from regression analysis, while the CGE model used here has regression derived elasticity parameters embedded. Accordingly, the CGE model provides annual employment impacts for the city labor market, and from these estimated job losses, total employment elasticities for the city's work force can be calculated. Figure 4 provides city employment elasticities for 2021 across the three key scenarios, placing them in comparison with a select set minimum wage studies.

Under Scenario 2 (a worst case), the CGE model yields an employment elasticity of -0.11, similar to Neumark, Sala & Wascher (2014) who find relatively high job loss impacts among teens, and Sabia, Burkhauser & Hansen (2012), who also find high job loss effects among workers with only a high school diploma. Under Scenario 4 (a most likely case), the CGE model produced an employment elasticity of -0.09, similar to the minimum wage elasticities found by Belman & Wolfson (2014), an aggregation of more than 70 studies. And, under Scenario 5 (a best case), the CGE produced an employment elasticity of practically zero, which is similar to Dube, Lester & Reich (2010) for service workers, Card & Krueger (2000) for fast food workers, and Addison, Blackburn & Cotti (2014) for restaurant and bar sector workers (Appendix 1 provides the labor demand elasticity measures for select industries most impacted by the $15 MWP).

With the CGE model's annual job loss forecast, we are able to produce a short-term impact in 2021 and a long-term impact in 2026 for the District of Colombia (Table 5). In addition to the city's minimum wage being annually adjusted to the area's consumer price index, the difference in the two sets of impacts in the table stem from the adjustment process (i.e. changes in prices, capital intensity and other productivity dynamics) of the regional economy and the subsequent behavioral changes of its economic agents, which we describe in greater detail within Appendix A. Table 5 shows that in the worst-case scenario, 1,680 and 2,757 DC residents are estimated to lose their job in 2021 and 2026, respectively. In the most likely scenario, 1,074 and 1,860 city residents will experience job loss in 2021 and 2026, respectively. In the best-case scenario, where affected businesses tend to offset the vast majority of the higher labor cost with significant productivity and efficiency gains, only 109 and 358 city resident workers are estimated to lose their job in 2021 and 2026, respectively. Interestingly, Table 5 shows that city residents accounted for 60-65 percent of the job losses in the short term, but, five years later in the longer-term, account for 77-82 percent of the job losses.[17] This reflects displacement effects and other dynamic and intertemporal economic interactions that will likely take place throughout the regional economy over time. City residents face increased competition from job seekers across the region who have greater incentive to look for minimum wage work in DC relative to neighboring jurisdictions due to the $15 MWP.

Earned Income Tax Credit Impacts

The Scenario 4 CGE model estimates reveal that approximately 1,074 residents will be unemployed because of this policy. Examining a random 1,074 tax filers from among the 60,748 resident tax filers as representative of actual residents that will lose their job because of this policy, we can provide a relatively detailed description of the economic characteristics of such tax filers. With these unemployed city workers from the CGE model as inputs into the IEM, the IEM produces a total net change in estimated federal adjusted gross income (primarily wages and

[17] It is not expected that city residents that are consequently unemployed by this policy will remain so indefinitely. Such residents are likely to eventually regain employment in the neighboring counties of Maryland and Virginia where the minimum wage is lower.

salaries) for city residents in 2021 that is only $6.6 million (3.6 percent) higher than the CGE estimate.[18]

The IEM reveals that 63 percent of the city's entire EITC population will experience wage increases as a result of the $15 MWP.[19] In the aggregate and as shown in Table 6, resident EITC recipients subject to the $15 MWP remaining employed in the District will lose $10.4 million in federal EITC and $6.0 million in DC EITC but would gain $54.6 million in higher wages.[20] The EITC reduction derives from higher annual wages, increasing the share of recipients in the "phase-out" portion of the EITC program from 55 percent before the policy to 68 percent after the policy in 2021.[21] In total, working residents affected directly by the $15 MWP will experience an on average 16.5 percent increase in wage and salaries in 2021[22] (Table 7). Collectively, it is estimated that they will gain $192.2 million in higher wage and salaries, but will consequently lose $10.4 million in federal EITC and $6.0 million in DC EITC. In sum, it appears that the interaction between the $15 MWP and the EITC produces a net improvement in resources on the order of $180 million. On an individual level, the estimated average income increase of an EITC recipient is $3,097 under the $15 MWP, leading to a predicted $331

[18] The IEM produces a total net change in wages and salaries ($192.2 million) for city residents in 2021 that is 3.6 percent higher than the CGE estimate of ($185.6 million). But, the IEM produces a total net change in DC income taxes ($3.6 million) for city residents in 2021 that is 41 percent lower than the CGE estimate of ($6.1 million). The considerably higher CGE estimate for the net increase in DC individual income tax revenue likely stems from an appreciably higher effective DC income tax rate embedded within the CGE model. (Fahimullah et al., 2017)

[19] This analysis also adjusts the Internal Revenue Service Earned Income Tax Credit schedule for inflation so that the appropriate 2021 tax credit amount can be estimated for each eligible tax filer in this study with respect to income level, family size and marriage status for the years under investigation.

[20]The model simulates that in 2021 there will actually be 4,490 fewer DC residents in the EITC program due to the estimated 803 EITC recipients who lose jobs and 3,673 childless workers who will earn more annual income than the federal EITC allows for this subgroup of filers.

[21] For example, the 2015 federal EITC Schedule indicates that an unmarried EITC recipient with one child in the phase out portion of the schedule would lose 15.98 cents in the federal credit for every additional dollar increase in annual wage and salary.

[22] It is likely that the 1,074 DC residents that lose their DC jobs will eventually gain employment (notwithstanding a national economic slowdown) in their respective industry but in one of the neighboring counties in Maryland and Virginia without such a high mandatory minimum wage.

reduction in the size of the federal and local EITC benefit for a full-time worker employed in the city through 2021 (Table 8).

Other Safety Net Programs

An additional concern is that increased income for low-wage residents from the $15 MWP may be so large as to disqualify them from other important social welfare benefits, many of which are out of reach for economically disadvantaged families (e.g. housing, health insurance). This is a specific application to a more general question concerning whether and how social safety net programs interact (Grogger 2003; Moffitt 2015). For example, low income families in the city with incomes below $32,000 for a family of four, are eligible to receive rental housing subsidies.[23] For food assistance (SNAP), a household of two has a maximum salary of $20,000 to be eligible for food subsidies. Minimum wage increases may potentially push some households above eligibility thresholds.

There are noteworthy distinctions between social safety net programs, the in-depth discussion of which lies beyond the scope of our analysis. To name just a few, food stamps are an entitlement; for the most part, all who qualify can and should receive benefits if they so desire. On the other hand, there are well-documented, long waiting lists for housing assistance, which is increasingly delivered via cash vouchers (Collinson et al. 2016). As program eligibility is concerned, many programs contain a range of provisions to enhance work incentives, including gradual phase-outs of near-cash program benefits, standard deductions for household

[23] US Department of Housing and Urban Development, Program Income Limits, 2016.

size, earnings disregards, and allowances for heating cooking, electricity, and other utilities.[24] While it is possible that some households may face a trade-off between higher annual income and access to the safety net, the more likely case may be one in which households experience gradual benefit reductions in food and housing assistance (e.g. Steuerle 2015).

VII. Conclusion

We utilize (1) a dynamic CGE model to estimate the effect of the city's $15 MWP on the local economy in the short-run and long-run, and (2) a comparative static tax micro simulation model to estimate the effect of the $15 MWP on federal and local EITC levels in the city in 2021. We find that the increase in the District of Columbia's minimum wage will produce significant income gains for most of the city's lowest wage earners and job loss (presumably temporary) for a very small number of other workers. These findings are broadly consistent with DC-focused studies by Nichols and Schwabish (2014) and Acs et al. (2014) that adopt a partial equilibrium, regression-based framework. We also find that 63 percent of the 60,000 EITC recipients living in the city will lose a total of $16.4 million in federal and local EITC payments in 2021 while gaining $54.6 million in additional labor income by way of the $15 MWP. This suggests that the $15 MWP will shift some of the costs associated with income support for the working poor from local government to the private sector.

CGE models can help inform policymakers on the potential benefits and consequences of major policy changes. Their use at all levels of government reflect the needs of policymakers and elected officials, who are called upon to report how economic policy decisions will potentially help or harm constituencies. While previous minimum wage studies generally examined modest

[24] https://www.fns.usda.gov/snap/fact-sheet-resources-income-and-benefits

increases to the minimum wage, the District of Columbia is on track to nearly double its minimum wage over a seven-year period. Over this time, it is plausible that neighboring jurisdiction policies, or even the federal government, could change minimum wage as well, further altering firm, worker, and consumer incentives. This doubling of the city's minimum wage will also take place as the city implements a newly enacted Universal Paid Leave Policy, which also raises business costs. Assessments of local minimum wage impacts should therefore acknowledge such potentially confounding factors by considering how worker and firm-level responses could vary in relation to a combination of such factors.

This study finds that job losses will be relatively small while incomes of most workers subject to the minimum wage will improve significantly. Concurrently, average firm profits are likely to decrease. Due to reduced business competitiveness relative to the regional metro area, we expect less than a one-half percentage point loss in gross state product. Ultimately, assessing the overall impacts of a $15 MWP will depend, in large part, on the balance of worker incomes vis-à-vis business profits and competitiveness for a given state or local economy. Distinguishing economic welfare across opposite sides of the market—business profits and competitiveness versus increased worker well-being (particularly workers at and near the bottom of the income distribution)—is challenging, especially when many workers derive much of their identity, satisfaction, and self-worth via the workplace. In the case of DC, the model suggests only small disruptions to employment and average firm profits.

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Table 1. The Number of Jobs Impacted by the DC $15 MWP, by Occupation

2-digit SOC Occupation	Jobs by Occupations and By 2014 Wage Rate Levels						Total Jobs
	$8.25 (2014 Min.Wage)	$8.25 - $11.50	$11.50 -	$12.50 -	$13.50- $15.00	$15.00- $18.00	
Food Preparation and Serving Related Occupation	4,040	32,076	4,062	2,588	2,394	3,268	48,428
Office and Administrative	2,303	3,874	2,008	2,480	4,588	11,440	26,692
Building and Grounds	800	3,773	2,092	2,381	3,642	5,365	18,054
Sales and Related	1,875	8,842	2,552	1,669	1,399	1,385	17,721
Personal Care and Service	674	4,234	1,534	1,090	1,107	1,523	10,161
Protective Service	556	1,179	675	848	1,617	4,030	8,904
Healthcare Support	339	2,673	1,300	1,167	1,368	1,899	8,746
Transportation and Material	390	3,151	306	350	600	1,422	6,219
Community and Social	320	400	265	360	714	1,653	3,713
Education, Training, and	535	311	219	270	485	1,654	3,474
Construction and Extraction	126	265	181	230	470	1,363	2,635
Arts, Design, Entertainment, Sports, and Media	921	40	67	78	181	936	2,222
Business and Financial	808	-	-	1	34	901	1,745
Healthcare Practitioners and Technical	463	158	85	104	195	670	1,676
Legal	1,118	-	-	-	-	237	1,355
Life, Physical, and Social	217	166	99	127	244	727	1,580
Installation, Maintenance, and	149	77	119	145	277	746	1,514
Production	207	300	119	110	144	292	1,171
Management	390	-	-	-	-	235	624
Computer and Mathematical	219	-	-	49	89	294	650
Architecture and Engineering	42	-	3	3	6	81	135
Farming, Fishing, and	-	-	-	-	-	-	-
Total	**16,492**	**61,518**	**15,686**	**14,049**	**19,554**	**40,120**	**167,419**

Table 2. Estimated Impact of the DC $15 MWP on Wages and Salaries in 2021 ($ in millions)

	All DC Employees	DC Residents
Total Private Wages & Salaries ($11.50 MWP- baseline)	$53,056.0	$21,222.0
Total Private Wages & Salaries ($15 MWP - policy simulation)	$53,549.0	$21,419.0
Estimated Change in Wages & Salaries (includes spillover)	$493.2	$197.3
Change in Wages & Salaries as a Percentage	0.93%	0.93%

Table 3. The Number of Jobs Held by City Residents Impacted by the DC $15 MWP in 2014

Estimated Wage Rates	All DC Jobs	DC Jobs Held by Residents
Up to $8.25 minimum wage	16,492	6,597
$8.26-$11.50	61,518	24,607
$11.51-$12.50	15,686	6,274
$12.51-$13.50	14,049	5,620
$13.51-$15.00	19,554	7,822
Sub Total (Wage Rate up to $15/hr)	*127,298*	*50,920*
Wage Rate Between $15-$18 (Spillover)	40,120	16,048
Total	**167,419**	**66,968**

Table 4. Summary of the DC $15 MWP Simulation Model: Cases and Underlying Assumptions

Scenario	Description	Assumption(s)	Policy Shocks in 2021
#1	Base Case (Minimal Workers Effected, No Offsetting Gains)	Only workers earning less than $15 an hour in 2014 will benefit	A. $387 million increase Workers' Wages*; B. $417 million increase in business costs
#2 (Worst Case)	Base + Spillover (No Offsetting Gains)	Scenario 1 plus workers earning $15-$18 in 2014 will also benefit	A. $493 million increase Workers' Wages* B. $531 million increase in business costs
# 3	Base + Spillover + Productivity	Scenario 2 plus businesses offset 30% of the increase in costs due to increased productivity	A. $493 million increase Workers' Wages* B. $372 million increase in business costs
# 4 (Most Likely Case)	Base + Spillover + Productivity + Consumption	Scenario 3 plus wage gainers will spend all of their additional income on consumption	A. $493 million increase Workers' Wages*; B. 0.150%, increases in consumption by DC residents** C. $372 million increase in business costs.
# 5 (Best Case)	Base + Spillover + Consumption + Efficiency Wage	Scenario 4 plus offset 75% of the increase in costs due to increased productivity and other efficiencies	A. $493 million increase Workers' Wages*; B. 0.150%, increases in consumption by DC residents** C. $80 million increase in business costs

* DC resident employees share 40% of the wage increase.
** The consumptions by residents of Montgomery county, Prince George county of Maryland, Fairfax county, Arlington county and Alexandra city of Virginia will increase by 0.040%, 0.057%, 0.036%, 0.065% and 0.060% respectively.

Table 5. Employment Elasticities and Employment Changes for the District of Columbia's $15 MWP

Scenario	CGE Elasticities in (2021)	Employment Changes					
		For DC Residents (2021)	For All Workers (2021)	DC Share (2021)	For DC Residents (2026)	For All Workers (2026)	DC Share (2026)
Worst Case	-0.11	-1,680	-2,758	60.9%	-2,757	-3,597	76.6%
Most Likely Case	-0.09	-1,074	-1,652	65.0%	-1,860	-2,262	82.2%
Best Case	0.00	-109	+18	-	-358	-173	206.9%

Table 6. Estimated Total Net Impact of the DC $15 MWP on All DC EITC Recipients in 2021 ($ in millions)

	Without	With	Net Difference	
	$15 MWP	$15 MWP	$ Amt	% Chg.
Wage & Salaries	$595.3	$649.9	$54.6	9.2%
DC Indiv. Inc. Tax	$10.0	$10.5	$0.5	5.0%
Federal EITC	$92.2	$81.8	$(10.4)	-11.3%
DC EITC	$36.9	$30.9	$(6.0)	-11.3%

Table 7. Estimated Total Net Impact of the DC $15 MWP on all DC Residents in 2021($ in millions)

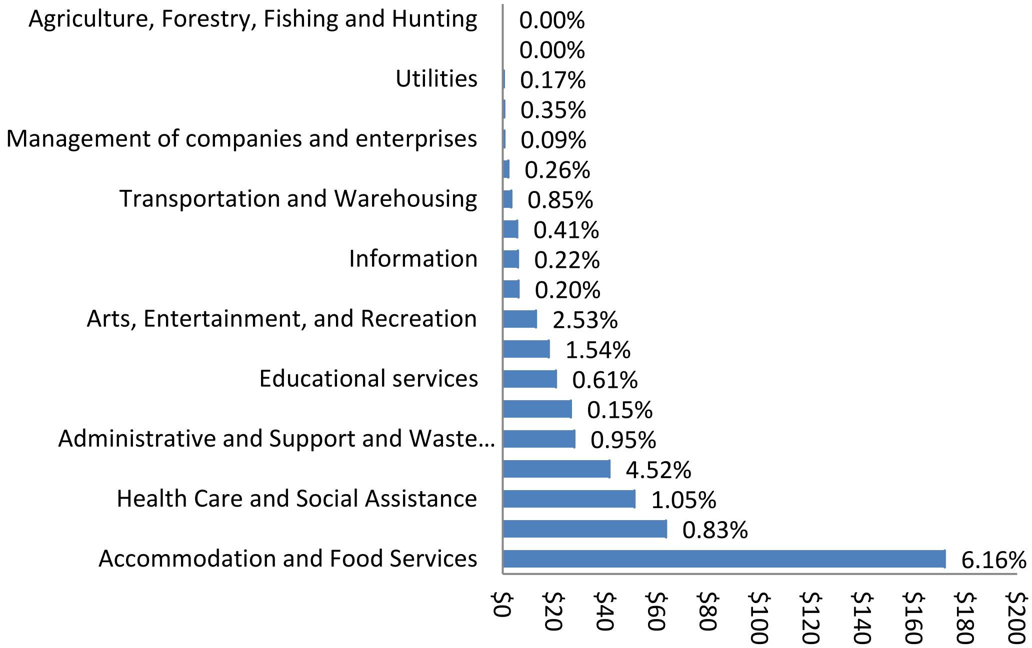
	Full-Time Workers		Part-Time Workers[25]		Job Losers	Total	
	$ Amt.	% Chg.	$ Amt.	% Chg.	$ Amt.	$ Amt.	% Chg.
Chg. in Wage & Salaries	$235.3	21.7%	$(26.1)	(32.3%)	$(16.9)	$192.2	16.5%
Chg. in Total DC Indiv. Inc. Tax	$4.3	16.4%	$(0.3)	(29.0%)	$(0.4)	$3.6	13.5%
Chg. in Federal EITC	$(4.8)	(7.4%)	$(4.6)	(35.6%)	$(1.0)	$(10.4)	(11.3%)
Chg. in DC EITC	$(3.4)	(7.4%)	$(1.8)	(35.6%)	$(0.7)	$(6.0)	(11.3%)
Net Impact	**$231.3**	**19.0%**	**$(32.8)**	**19.0%**	**$(19.0)**	**$179.5**	**13.6%**
# Impacted Tax Filers	52,039		7,635		1,074	60,748	

[25]In this analysis, we designated residents that earned between $3,000 and $10,000 as undoubtedly part-time workers, and residents that earned more than $10,000 as full-time workers. In 2021, without the $15 MWP there were 12,192 part-time earners in the simulation, but with the significant income gains under the new policy there were only 7,635 part-time workers in the analysis

Table 8. Average Effect of the DC $15 MWP on EITC Credit Level for a Full-time Working EITC Recipient in 2021

	Without $15 MWP	With $15 MWP	Net Difference $ Amt	Net Difference % Chg
Avg. Wage & Salaries	$20,095	$23,192	$3,097	15.4%
Avg. DC Indiv. Inc. Tax	$355	$384	$29	8.2%
Avg. Federal EITC	$2,538	$2,344	($194)	(-7.6%)
Avg. DC EITC	$1,807	$1,670	($137)	(-7.6%)

Figure 1. Gross Impact of Minimum Wage Increase by Industry ($ millions)



Source: 2014 BLS Occupational Employment and Wage Estimates for DC Converted to Industry Information Using National Industry Occupation Matrix

Figure 2. Resident Job Loss Levels by Scenario

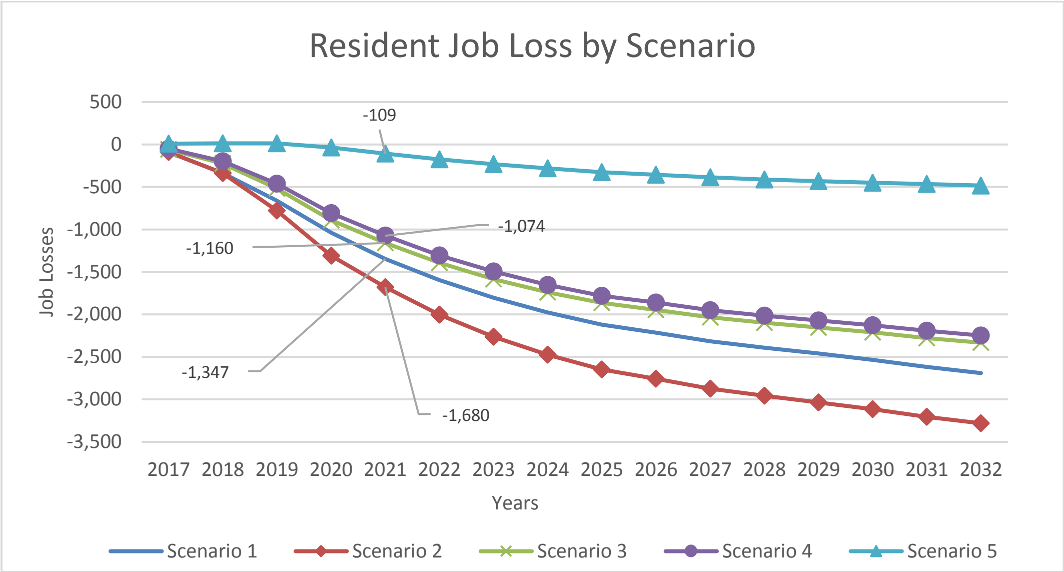


Figure 3. Percent Change in DC GSP by Scenario

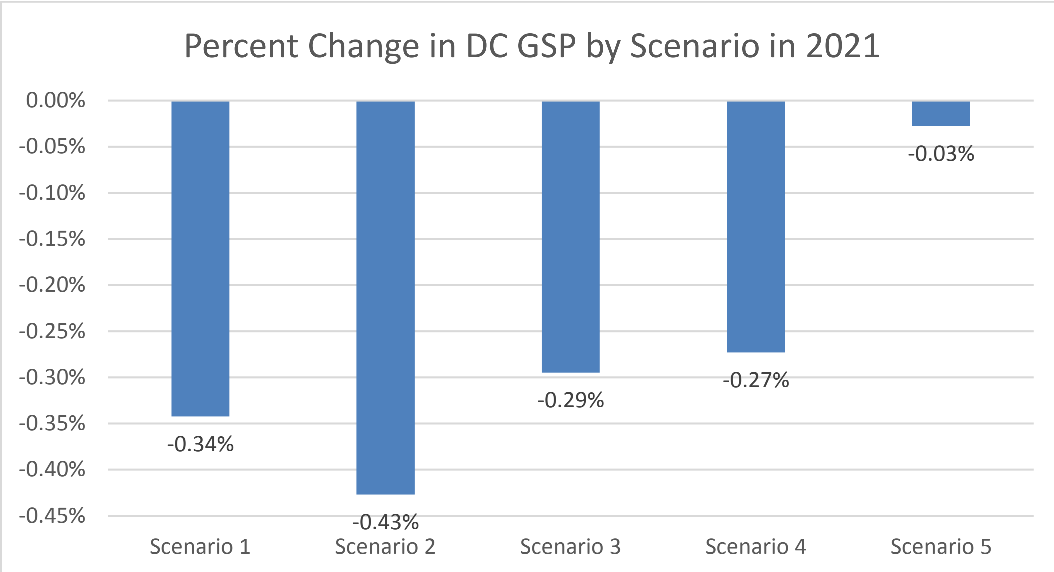
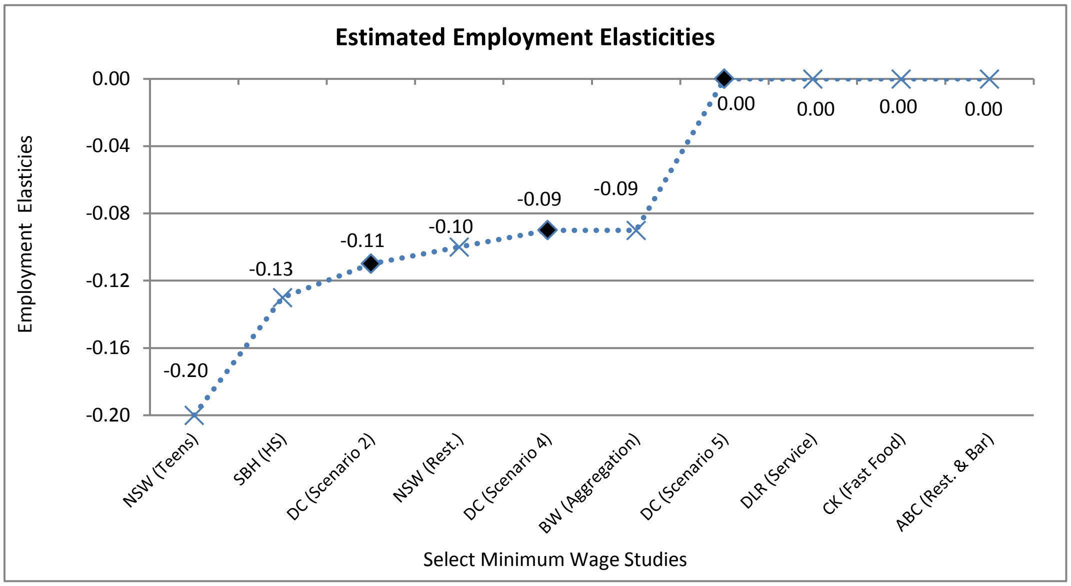


Figure 4. Estimated Employment Elasticities from Select Minimum Wage Studies



Appendix A

REMI CGE Labor Demand Elasticities

Below, we provide a more detailed description of the REMI computable general equilibrium model, adapted from descriptions of the model provided by REMI (2015).

With an output in sector *i* and intermediate input determined, the optimal labor and capital demand in sector *i* can be calculated from a constant returns to scale Cobb-Douglas function of value added for sector *i*:

$$VA_i = A_i(L_i)^{\alpha_i}(K_i)^{\beta_i}(F_i)^{\gamma_i}, \tag{1}$$

where A_i is total factor productivity, L_i, K_i, and F_i are labor, capital and fuel sector *i* respectively, and $\alpha+\beta+\gamma=1$.

Demand for labor can be derived through cost minimization and be expressed as

$$L_i = VA_i\left(\frac{1}{A_i}\right)\left(\frac{w_i}{\alpha_i}\right)^{\alpha_i-1}\left(\frac{r_i}{\beta_i}\right)^{\beta_i-1}\left(\frac{f_i}{\gamma_i}\right)^{\gamma_i-1} \tag{2}$$

Where w_i is the wage rate, r_i is the cost of capital, and f_i the cost of fuel, the short run labor demand elasticity (assuming constant product price and fixed level of capital) is given by:

$$\sigma_L = \frac{\partial\ln(\mathrm{L}_i)}{\partial\ln(w_i)} = -\frac{1}{1-\alpha_i} \tag{3}$$

However, beyond the very immediate short run, our assumption of constant product price and fixed level of capital will not hold. As the cost of production increases (thus less is produced), the demand for labor will fall. Also when the wage for labor in industry *i* increases, demand for labor decreases as the price of capital is now relatively cheaper, and it pays to substitute capital for labor until the share of income going to labor, capital and fuel are equal to α, β and γ respectively. Our CGE model generates long run elasticities that reflect the product demand elasticity and capital labor substitution.

The long run elasticity is given by $n + (1 - \alpha_i)r$, where n is the product demand elasticity and r is capital labor substitution elasticity, which is 1 for Cobb-Douglas production function (Benewitz and Weintraub, 1964). Note that labor demand elasticities for each industry generated by our CGE model not only reflect labor wage relationship for each industry, but also reflect the wage increase in other industries. For example, rising wage in industry *i* will impact product price and product demand for industry *i*, and through input-output relationships, may impact product demand for all other industries, hence may impact labor demand by these industries. The following table shows the short run labor demand elasticity assuming constant product price, fixed level of capital and no change in capital, labor nor technological productivity for select industries in the District of Columbia. However, in the drive towards a new regional economic general equilibrium, the model allows for price adjustments, capital labor substitutions, labor force migration changes, and technological changes. And these binding dynamics produce a labor demand elasticity in 2021 vis-à-vis the respective employment and wage changes also in 2021.

Appendix Table 1. Short and Long-Run Labor Demand Elasticities and Employment Impacts

Industry	Labor Demand Elasticity (Short Run)	Labor Demand Elasticity in 2021 (CGE)	Employment change in 2021(CGE)	Wage Change in 2021(CGE)
22 - Utilities	-1.38	-0.80	-0.1%	0.1%
23 - Construction	-2.44	-1.64	-0.5%	0.3%
334 - Computer and electronic product manufacturing	-2.49	-0.17	0.0%	0.1%
323 - Printing and related support activities	-3.06	-0.26	-0.1%	0.4%
42 - Wholesale trade	-2.01	-0.41	-0.1%	0.2%
44-45 - Retail trade	-2.33	-0.32	-1.1%	3.4%
482 - Rail transportation	-2.16	-0.11	0.0%	0.2%
492 - Couriers and messengers	-2.82	-0.26	-0.2%	0.8%
485 - Transit and ground passenger transportation	-1.94	-0.23	-0.7%	3.0%
487-488 - Scenic and sightseeing transportation and support activities	-2.94	-0.23	-0.2%	0.8%
511 - Publishing industries, except Internet	-1.87	-0.25	0.0%	0.2%
512 - Motion picture and sound recording industries	-1.53	-0.32	-0.3%	0.8%
518,519 - Internet publishing and broadcasting	-1.95	-0.37	0.0%	0.1%
515 - Broadcasting, except Internet	-1.51	-0.23	0.0%	0.2%
517 - Telecommunications	-1.47	-0.19	0.0%	0.1%
524 - Insurance carriers and related activities	-2.02	-0.05	0.0%	0.1%
531 - Real estate	-1.05	-0.03	0.0%	1.2%
532,533 - Rental and leasing services	-1.21	-0.06	-0.1%	1.6%
54 - Professional, scientific, and technical services	-3.02	-0.21	0.0%	0.1%
55 - Management of companies and enterprises	-6.02	-1.60	-0.1%	0.1%
561 - Administrative and support services	-3.83	-0.13	-0.1%	0.8%
562 - Waste management and remediation services	-2.16	-0.26	-0.1%	0.5%
61 - Educational services; private	-5.89	-0.09	0.0%	0.5%
621 - Ambulatory health care services	-4.30	-0.32	-0.2%	0.6%
622 - Hospitals; private	-8.51	-0.06	0.0%	0.4%
623 - Nursing and residential care facilities	-7.52	-0.24	-0.6%	2.7%
624 - Social assistance	-5.19	-0.19	-0.3%	1.5%
711 - Performing arts and spectator sports	-1.98	-0.16	-0.3%	1.6%

712 - Museums, historical sites, zoos, and parks	-4.58	-0.09	-0.1%	1.6%
713 - Amusement, gambling, and recreation	-2.52	-0.18	-0.7%	4.2%
721 - Accommodation	-2.02	-0.16	-0.3%	2.2%
722 - Food services and drinking places	-2.89	-0.22	-1.4%	6.4%
811 - Repair and maintenance	-2.98	-0.27	-0.5%	1.8%
812 - Personal and laundry services	-2.15	-0.19	-0.7%	3.6%
813 - Membership associations and organizations	-4.38	-0.26	-0.1%	0.5%