Minimum Wage
Its Role in the Youth Employment Crisis

by Randall Pozdena, PhD
December 2016
About the Author

This report was authored by Randall Pozdena, President, QuantEcon, Inc., an Oregon-based consultancy. He received his BA in Economics, with Honors, from Dartmouth College and his PhD in economics from the University of California, Berkeley. Former positions held by the author include professor of economics and finance, senior economist at the Stanford Research Institute (SRI International) and research vice president of the Federal Reserve Bank of San Francisco. He also served on numerous public, non-profit, and private boards and investment committees. He is a member of the CFA Institute and the Portland Society of Financial Analysts.

Contact information:

- Randall J. Pozdena, PhD
  QuantEcon, Inc.
  PO Box 280
  Manzanita, Oregon 97130
- Phone 503.368.4604
- E-Fax 503.296.5495
- Email pozdena@quantecon.com

About Cascade Policy Institute

Founded in 1991, Cascade Policy Institute is Oregon's premier policy research center. Cascade's mission is to explore and promote public policy alternatives that foster individual liberty, personal responsibility, and economic opportunity. To that end, the Institute publishes policy studies, provides public speakers, organizes community forums, and sponsors educational programs. Cascade Policy Institute is a tax-exempt educational organization as defined under IRS code 501(c)(3). Cascade neither solicits nor accepts government funding and is supported by individual, foundation, and business contributions. Nothing appearing in this document is to be construed as necessarily representing the views of Cascade or its donors. The views expressed herein are the author’s own.

Copyright 2016 by Cascade Policy Institute. All rights reserved.

Cascade Policy Institute
  t: 503.242.0900
  f: 503.242.3822
  www.cascadepolicy.org
  info@cascadepolicy.org
  4850 SW Scholls Ferry Road
  Suite 103
  Portland, OR 97225
# Table of Contents

About the Author .................................................................................................................................................. i

Introduction and Executive Summary ......................................................................................................................... 1

The Origins of the Minimum Wage ................................................................................................................................. 2
  Minimum Wage Rate Policy in Oregon .......................................................................................................................... 3
  The Focus of this Paper ................................................................................................................................................... 4

The Basic Economics of the Minimum Wage ................................................................................................................... 4

The Prior Literature on Minimum Wage Impacts ............................................................................................................ 5
  Summary of Findings from the Literature .......................................................................................................................... 6
    The State of the Findings in 1980s and 1990s .................................................................................................................. 7
    The Debate over the Size of the Employment Impacts ..................................................................................................... 8
      Before-and-after approach: Card, Katz, and Kreuger .................................................................................................. 8
      Heterogeneity concerns: Dube et al. ............................................................................................................................ 9

The Author’s Research: A Dynamic Modeling Approach .................................................................................................. 10
  The Modeling Approach ................................................................................................................................................. 11
    Data Considerations ....................................................................................................................................................... 11
  Application of the VAR Analysis to the Youth Population, 1979-2014 ........................................................................ 12
    Increases in the Minimum Wage are Casually Related to Adverse Impacts ............................................................. 12
    Increases in the Minimum Wage are Adverse and Persistent ....................................................................................... 13
      General Findings ......................................................................................................................................................... 13
      The Impact on Employment .......................................................................................................................................... 13
      The Impact on Non-Participation in the Labor Force ................................................................................................. 14
      The Impact on Average Real Wages ............................................................................................................................... 15
      The Impact on Unemployment and the Unemployment Rate ..................................................................................... 15

Implications for All Workers .......................................................................................................................................... 16
  VAR Results for All Workers ......................................................................................................................................... 16

Implications for Oregon ................................................................................................................................................. 17
  The Likely Impact of Oregon’s New Minimum Wage Policy on Youth ........................................................................ 17

Conclusion ....................................................................................................................................................................... 19

Endnotes ........................................................................................................................................................................ 20

Bibliography .................................................................................................................................................................. 23
Minimum Wage
Its Role in the Youth Employment Crisis

INTRODUCTION AND EXECUTIVE SUMMARY

This paper examines the history of the imposition of a minimum wage, studies of its effects on youth, and the implications for current policy. A novel analytical technique produces important new findings regarding the adverse effects of the minimum wage on youth.

This topic is timely. Even as the International Labour Organization has declared that there is a worldwide “youth employment crisis,” a record number of U.S. states recently authorized minimum wage rate increases, either through legislation or ballot initiative. According to the National Council of State Legislators (2016), in 2014 and 2015, 11 enacted increases through legislation and four through ballot initiative. Thus far in 2016, two states, California and Oregon, have enacted new minimum wage policies that sharply increase their minimum wage levels, even after adjustments for inflation. Approximately three-fifths of the states' minimum wage levels exceed the federal minimum wage rate.

This has important bearing on the employment status of youth, because many economists believe that sharp increases in the minimum wage affect youth employment particularly negatively. Despite these regressive effects on this vulnerable class of workers, their plight is largely ignored in policy discussions. This paper reviews the theory of minimum wage impacts and more than four decades of others' research on the impacts of raising the minimum wage. I then use a statistical technique that has not been widely applied in the literature to develop my own estimates of impacts on the youth age cohort. I conclude from these efforts the following:

- Basic economic theory argues that wage levels are a consequence of the interactions of demand and supply conditions in labor markets. Wages are not a parameter of the economy that can be manipulated without consequence. Artificially raising the wage in a market economy will result in the use of less of the affected labor. The resulting reduction in employment will occur among workers already at a productivity disadvantage relative to others.

- Thus, youth wages are low because many are unskilled, lack work experience, and do not contribute sufficient value in the workplace to justify high wages. Since skill and productivity are acquired through accretion of experience and training, imposing a minimum wage that reduces youth employment has the potential to cause collateral damage. Specifically, doing so retards the future prospects of those who suffer the reduction in employment.

- Most of the very large literature on the impact of minimum wages supports the notion that increases in minimum wages impairs the employment prospects of youth and discourages them from participating in the labor force.

- Some of the key studies on which pro-minimum wage advocates rely have been criticized for poor design or implementation.

My approach confirms the view that the negative effects of minimum wage policy on youth are, in fact, material economically. I argue and demonstrate statistically that the adverse effects on youth employment and labor force participation are not only significant, but also causally related to minimum wage increases, and persistent. That is, the impacts of a one-time increase in the real (inflation-adjusted) minimum wage do not dissipate over time.

I then apply my findings to Oregon and find:

- Oregon's policy of indexing Oregon's minimum wage to the Consumer Price Index (CPI) – introduced in 2002 – resulted in a progressively more damaging minimum wage. This caused, by my calculation, a loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period.
Under Oregon's new law passed in 2016, the youth age cohort in Oregon will lose another 52,000 jobs by 2022. This is over 22 percent of the 2015 youth labor force. Also, 63,000 more Oregon youth will withdraw from the labor force. This is over 26 percent of the 2015 youth labor force.

Even beyond 2023, when the graduated increases under the new law have ceased, Oregon youth will continue to lose access to employment. This is both because of the persistent (albeit weakening) echoes of the 2016 law changes and Oregon's planned return to the 2002 indexing practice.

It is believed that labor organizations are advancing the current frenzy of large minimum wage hikes. It is argued that they see benefits to themselves—partly because their own contracts link their compensation to the minimum wage. Policy makers have joined the movement, having focused on the notion that minimum wages result in an improved distribution of income. The reality is that today's policies will impose on many youth the cruelest minimum wage of all—a wage of zero. From this author's perspective, regulatory intrusions into market wage-setting processes should not be undertaken lightly, both on first principles and my own and others' analyses. If they do, as done by the International Labour Organization, then they also have to be open about their potential culpability for creating the "youth employment crisis" that they themselves now decry.

**THE ORIGINS OF THE MINIMUM WAGE**

The minimum wage is a form of labor market regulation by which a government seeks to establish a floor to the hourly wage that employers can pay. Minimum wage policy has influence on the economy if the regulated minimum wage is above the lowest wage observed in the marketplace. Thus, by its very design, it is a policy that assumes society is better off if some willing workers are forced into unemployment (and receive a wage of zero) rather than being employed at the market wage.

Historically, the minimum wage was advocated as a remedy to the so-called sweatshop conditions that prevailed in post-industrial-revolution markets.

In the United States, the period 1880 to 1920 marked a dramatic transition from subsistence agriculture to industrial activity. In 1880, most Americans lived in isolated agricultural settings by a factor of three to one. By 1920, industrialization reduced that ratio by 69 percent. Employment in the manufacturing sector expanded four-fold from 2.5 to 10 million workers from 1880 to 1920.

The perception was that urban workers were exploited by employers and forced to work under harsh and low-wage conditions. Certainly from a modern perspective, this characterization of working conditions 100 years ago is not outlandish. However, except in slavery and peonage settings, workers (mainly drawn from poor agrarian settings) came to the industrializing regions for job opportunities voluntarily. Moreover, there is strong evidence that real wages and the standard of living increased continuously under these conditions.

### Table 1: Minimum Wage Rates, by State, June 2015

<table>
<thead>
<tr>
<th>State</th>
<th>State Minimum Wage</th>
<th>Rank</th>
<th>State</th>
<th>State Minimum Wage</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>$8.75</td>
<td>10</td>
<td>MT</td>
<td>$8.05</td>
<td>21</td>
</tr>
<tr>
<td>AL</td>
<td>$7.50</td>
<td>28</td>
<td>NC</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>AR</td>
<td>$8.05</td>
<td>21</td>
<td>ND</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>AZ</td>
<td>$9.00</td>
<td>6</td>
<td>NE</td>
<td>$8.00</td>
<td>24</td>
</tr>
<tr>
<td>CA</td>
<td>$8.23</td>
<td>18</td>
<td>NH</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>CO</td>
<td>$9.15</td>
<td>4</td>
<td>NJ</td>
<td>$8.38</td>
<td>13</td>
</tr>
<tr>
<td>CT</td>
<td>$10.50</td>
<td>1</td>
<td>NM</td>
<td>$7.50</td>
<td>28</td>
</tr>
<tr>
<td>DE</td>
<td>$8.25</td>
<td>14</td>
<td>NV</td>
<td>$8.25</td>
<td>14</td>
</tr>
<tr>
<td>FL</td>
<td>$8.05</td>
<td>21</td>
<td>OH</td>
<td>$8.10</td>
<td>20</td>
</tr>
<tr>
<td>GA</td>
<td>$5.15</td>
<td>45</td>
<td>OK</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>HI</td>
<td>$7.75</td>
<td>26</td>
<td>OR</td>
<td>$9.25</td>
<td>3</td>
</tr>
<tr>
<td>IA</td>
<td>$7.25</td>
<td>31</td>
<td>PA</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>ID</td>
<td>$7.25</td>
<td>31</td>
<td>RI</td>
<td>$9.00</td>
<td>6</td>
</tr>
<tr>
<td>IL</td>
<td>$8.25</td>
<td>14</td>
<td>SC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>$7.25</td>
<td>31</td>
<td>SD</td>
<td>$8.50</td>
<td>12</td>
</tr>
<tr>
<td>KS</td>
<td>$7.25</td>
<td>31</td>
<td>TN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>$7.25</td>
<td>31</td>
<td>TX</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>LA</td>
<td>$9.00</td>
<td>6</td>
<td>UT</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>MA</td>
<td>$8.25</td>
<td>14</td>
<td>VA</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>MD</td>
<td>$7.50</td>
<td>28</td>
<td>VA</td>
<td>$9.15</td>
<td>4</td>
</tr>
<tr>
<td>ME</td>
<td>$8.15</td>
<td>19</td>
<td>WI</td>
<td>$7.25</td>
<td>31</td>
</tr>
<tr>
<td>MI</td>
<td>$9.00</td>
<td>6</td>
<td>WV</td>
<td>$8.00</td>
<td>74</td>
</tr>
<tr>
<td>MN</td>
<td>$7.65</td>
<td>27</td>
<td>WY</td>
<td>$5.15</td>
<td>45</td>
</tr>
<tr>
<td>MO</td>
<td>$7.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>$7.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nevertheless, revulsion over the sweat-shop working conditions (especially as they involved women) stimulated the first minimum wage laws in Australia, France, New Zealand, Norway, and the United Kingdom in the late 19th and early 20th centuries. In the laborite and socialist reform zeal after World War I, however, the movement to propagate minimum wage regulation became more organized. Article 427 of the Treaty of Versailles referred to “the payment to the employed of a wage adequate to maintain a reasonable standard of life as this is understood in their time and country” as an international criterion of labor policy. The International Labour Organization (ILO) was established in
1919 as an agency of the League of Nations to advance labor policy. At its 1919 conference, implementation of Article 427 was recommended.

In the U.S., minimum wage laws were a matter of state policy only until the Great Depression. According to authorities cited by Neumark and Wachster (2008), 25 states introduced minimum wage regulations between 1912 and 1936, with Oregon in 1913 being the first with legal sanctions for non-compliant employers. The U.S. was not a member of the ILO, having rejected membership in the League of Nations. However, President Franklin Delano Roosevelt urged Congress to allow U.S. membership in the ILO and it did so in 1934. A federal minimum wage law came into effect with the enactment of the Fair Labor Standards Act (FLSA) of 1938, and the Code of Federal Regulations, Title 29, Chapter V.

In effect, the FLSA policy trumps state minimum wage rates, unless the latter are higher than the FLSA policy rate. Since then, the ILO has championed minimum wage policy around the world. Approximately 150 countries seem to have adopted minimum wage policies to some degree. Perhaps not coincidentally, youth unemployment has become a worldwide problem, peaking at the highest level ever recorded in 2013. Additionally, the youth labor force decreased absolutely by 29.9 million over the period, despite the youth population growth of 185 million, according to ILO (2015). It is interesting to note, however, that several modern industrialized countries, such as Hong Kong, Saudi Arabia, Chile, Denmark, Singapore, and United Arab Emirates do not have minimum wage regulation.

As of this writing, all but five U.S. states have their own minimum wage laws (Louisiana, Mississippi, Alabama, Tennessee, and South Carolina). Two states employ a lower state minimum wage than the federal minimum wage (Georgia and Wyoming). In both of these groups of states the federal minimum applies. Another 14 states set a state minimum wage to the federal minimum wage by statute and 30 states and the District of Columbia have set their minimum higher than the federal minimum wage.

Table 1 presents the rates as of June 2015. Because of the amount of legislative activity in this realm at the current time, the rates presented in Table 1 may no longer be current. In addition, in some states there are policies that provide for youth differentials, rural differentials, and other departures from the wage rates stated here. In performing analysis of the effects of the minimum wage, the practice is generally to employ the highest effective rate, since that rate is most likely to form employer expectations of labor costs and, hence, employment behavior.

**Minimum Wage Rate Policy in Oregon**

Note that Oregon's rate in Table 1 is the third highest among the states and the District of Columbia. This is reflective of Oregon's long history of intervention in labor markets to serve social goals. Indeed, Oregon imposed a minimum wage rate in 1913—the first compulsory minimum wage in the nation. It was passed after a survey of working conditions of women and minor children conducted by Oregon's Consumer League. The enabling legislation was passed to “protect the lives and health and morals of women and minor workers.”

The Industrial Welfare Commission was empowered to set minimum wage rates for women and minor workers. In modern times, the rate has been set by ballot initiative. In 2001, the State wrested control from counties and localities (who could enact their own minimum wage rates). In 2002, voters approved Measure 25, raising the statewide minimum wage to $6.90 and initiating an annual indexing scheme based on the Consumer Price Index. The rate in June 2015 was $9.25 per hour, the second highest state minimum wage in the United States.

Oregon joined the recent advocacy of higher minimum wages—a movement that has reportedly been lead by the Service Employees International Union (SEIU). Some argue that their motivation is the fact that they often enjoy contracts that link their wage increases to minimum wage hikes. President Barack Obama raised the level of the debate in 2013, in his support for a bill that would raise the current federal minimum ($7.25) to $12 in 2020, and his unilateral change in the rate paid those under federal contracts to a minimum of $10.10. In Oregon, this led to a debate about the adequacy of its current minimum wage rate, and whether regional differentiation was useful. Two, competing ballot initiative processes were stimulated, one raising the minimum to $15 and one to raise it to $13.50. The state legislature, fearing the consequences of dueling initiatives, advanced Senate Bill 1532, which was signed into law on March 2, 2016.

“The reality is that today’s policies will impose on many youth the cruelest minimum wage of all—a wage of zero.”
The new minimum wage legislation sets out three annual schedules for raising the minimum wage on July 1 each year from its 2015 level to $12.50, $13.50, or $14.75 by 2022, after which time the rate resumes its inflation indexing. This constitutes increases of 4.1%, 5.4%, and 6.9% per annum, respectively, over the adjustment period. The three rates apply, respectively, to selected rural counties, urbanized areas outside the Portland metro area, and the counties that make up the Portland metro area. There are no youth differentials, but there is latitude for the state’s Commissioner of the Bureau of Labor and Industries to set a handicapped worker differential and a “student-learner” differential.11

The Focus of this Paper

The history reveals widespread proliferation of minimum wage regulation, and there is today a high degree of enthusiasm for raising the minimum wage. This enthusiasm contrasts sharply with the sentiments of many analysts. The research finds that the impact of a minimum wage on youth employment is, at best, ambiguous but mostly negative. Economists have long raised questions about whether the consequences of implementing minimum wage regulation are justified. Indeed, much of the literature analyzing minimum wage policy suggests that the minimum wage does great harm, especially to youthful and low-skilled persons. Despite this, it is clear that it remains a centerpiece of what is seen as “progressive” social reform movements. The purpose of this paper is four-fold:

- To familiarize lay readers with the theoretical underpinnings of minimum wage as a policy.
- To document the scope and consistency of findings in the literature, with special emphasis on a handful of studies that purport to find beneficial effects of the policy, even in the context of an advanced labor market setting such as the U.S.
- To present new research findings by this author that find even more grave consequences of raising minimum wages than are typically found.
- To use my research findings to evaluate the impact of the recently enacted, dramatic increases in Oregon minimum wages.

In the remainder of the paper, I thus first introduce the basic economic arguments for and against imposition of wage regulation from a theoretical point of view. I then review the existing empirical literature on the effect of the minimum wage. Since there have been a great number of studies of the economic impacts of minimum wages, I rely on others’ syntheses and meta-analyses to characterize the state of the literature through 2010 or so. Since then, because of the Great Recession and seemingly stagnant worker compensation levels, there has been renewed interest in minimum wage policy among labor unions and politicians. This renewed political interest has been served by a small number of new studies on the subject that have been adopted by advocates. Thus, an additional section is devoted to these controversial studies.

After summarizing others’ work, I present some of my own analyses. They differ in several important ways from the efforts of prior researchers. Most importantly, I develop a database and employ a technique that more aggressively tests for evidence of causal links between changes in minimum wage policy and economic outcomes. As part of this effort, I employ a method that tests for consistency among various, related measures of labor market impact. Like most economists working in this field, I employ a primary focus on the impact on “youth” employment (defined usually as those aged between 16 and 24 years of age). However, I also extend my analysis to the working age population as a whole. It is reasonable to expect a stunted degree of early-years’ work experience to have persistent effects as individuals attempt to make up for deficiencies in experience they may have missed as youth.

“...[M]uch of the literature analyzing minimum wage policy suggests that the minimum wage does great harm, especially to youthful and low-skilled persons.”

THE BASIC ECONOMICS OF THE MINIMUM WAGE

In modern markets, where there are many employers competing for labor, and labor is highly mobile, an individual employer must pay the market wage, set in the regional market for labor of a given skill level. The market wage, W_{MARKET}, is determined by the interplay of demand and supply of all workers and employers, as shown in Figure 1, leading to total employment equal to H_{MARKET} hours of work. Imposing a minimum wage, W_{MIN}, in excess of the market wage leads to only H_{MIN} hours of work—less than without the intervention.
Those who believe that a minimum wage policy would increase employment do not recognize the competitive and mobile nature of labor markets. Rather, they assume that all employers have so-called monopsony power. That is, they can individually set wages to whatever they please without losing employees or reducing the quality of employees’ work. This is illustrated in Figure 2.

In such a case, of course, they would employ fewer workers but would gain by capturing a larger share of the employees' valuable efforts. Figure 2 illustrates this case. Government intervention to set the minimum wage, $W_{MIN}$, higher than the monopoly wage, $W_{MONOP}$, would result in an increase in employment hours. The labor market conditions necessary for the monopsony model to be representative likely have not prevailed for a century. Even then, agrarian employment, self-employment, and migration were a check on the extent to which labor could be exploited in this fashion. This author and many other economists believe that employer monopsony power today is de minimis and irrelevant in most labor markets settings. Additionally, even under monopsony conditions, overly high minimum wage levels will reduce employment.13

Other theories and models have been advanced that identify hypothetical conditions under which an increase in the minimum wage could have positive effects on employment. These alternative models in general make strong assumptions about the workings of the labor market that are difficult to demonstrate. Some will be discussed in the next section. In general, however, as we will see, it is my opinion that the weight of the empirical evidence of the effect of minimum wage policy is in favor of the classic, market economic representation of minimum wage impacts in Figure 1.

Indeed, one of the purposes of this paper is to report, and demonstrate with new data, the ubiquity of this finding and its further elaboration.

**THE PRIOR LITERATURE ON MINIMUM WAGE IMPACTS**

New findings, using techniques not previously applied, are presented later in this paper. In this section, I briefly summarize the findings of prior literature that examined the impact of the minimum wage. The literature has grown to be quite large (far in excess of 100 formal studies). A wide variety of analytical techniques have been used to detect the economic effects of the minimum wage.

- **Before-and-after studies.** Also called event studies, these used measures of the changes in the impact variable immediately, or soon, after minimum wage policy is implemented or changed. Typically the sources of data are small surveys of workers in selected industries or locales. Prior conditions are used as the “controls” against which conditions after implementation are compared. This class of studies was the earliest to be applied because the quantity of data available was small when implementation was limited. Also, this technique is relatively simple to apply without the computing power available today.
• **Cross-sectional comparisons.** This approach using comparisons across jurisdictions—i.e., considering conditions where workers are not exposed to minimum wage policies versus conditions in locales where individuals have been exposed to minimum wage regulation. The statistical methods can be as simple as comparisons of anecdotes or complex statistical comparisons where myriad other, confounding effects are incorporated to control for the influence of their contemporaneous conditions.

• **Time-series studies.** These studies are an extension of the “before and after” studies, in the sense that they examine the trend in market conditions as minimum wage policy evolves. Although minimum wage policies do not change continuously, in some jurisdictions they are updated reasonably frequently. With a sufficiently long history of such changes (and the measures of the impact variables), it is conceptually possible to isolate the effects of minimum wage policy.

• **Pool or panel studies.** By pooling the data over time from many jurisdictions, one may potentially enlarge the sample size enough to more accurately isolate the effect of the minimum wage measures. Panel data structures are analogous, but unlike the former, preserve the identity of the jurisdiction to allow for unique jurisdictional effects over time.

• **Aggregate vs. disaggregate studies.** Cross-section, time-series, and pool or panel studies can be performed at the jurisdictional (aggregate) level or the individual (disaggregate) level. Since both are typically derived from similar sources, the choice comes down to the analyst’s a priori view about the importance of individual characteristics and the need to control for them in the analysis.

• **Microeconomic vs. macroeconomic studies.** The vast majority of studies have been microeconomic in focus; that is, they examine market or individual level data rather than embedding the analysis in an economy-wide (macroeconomic) model. However, some incorporate controls for the state of the economy, monetary policy, or other macroeconomic variables.

The range of impacts studied is similarly wide. However, they can be generally classified in the following broad categories.

• **Employment related impacts.** The impacts on jobs, the hours worked, working conditions, employer training, unemployment rates, and labor force participation rates fall into this category. It is fair to say that the employment related impacts have been studied the most comprehensively.

• **Wage and income impacts.** The financial impacts of the minimum wage look past the number of individuals employed or unemployed, etc., to those effects that bear upon standards of living. It is clear that this was a key, original motivation of minimum wage policy. As described in Figure 2, there was logic to minimum wage policy if some employers (primarily in monopsony-prone labor markets) paid less than the value of the marginal product of labor. Studies of the impacts on the distribution of income were a logical sequel to this concern.

• **Differential effects on population subgroups.** Because low wage rates are overwhelmingly observed among youth age cohorts and the unskilled, it is natural to expect variations in the effects of the minimum among these groups. The link between widening unemployment rate differentials between racial subgroups (black- and non-black teenagers) was asserted early by Milton and Rose Friedman to be the consequence of the minimum wage regulations, which he called the “the most, anti-black laws on the statute books.” In general, because of their sensitivity to the minimum wage, the youth subgroups continue to receive most of the attention in studies of minimum wage impacts.

• **Macroeconomic effects.** Macroeconomic impacts include such measures as economic growth, wage growth, poverty rates, and inflation. Although such impacts have been studied occasionally, because of the plethora of confounding influences, these impacts are often difficult to detect.

### Summary of Findings from the Literature

The literature on minimum wage impacts is so voluminous that it cannot easily be dealt with on a study-by-study basis. There are several, important phases of reviews that are helpful.
In this period, the early literature was reviewed, and many new studies prepared on behalf of the congressional Minimum Wage Study Commission. The Commission was authorized in 1977 in the political setting of discussions about indexing the minimum wage to inflation and accommodating a lower wage for youth. It reported its findings in Minimum Wage Study Commission (1981). Although commissioned by a largely Democratic congress, in the view of most economists, the Commission research was by and large balanced.

In the 1990s, Clinton Administration policy stimulated new research and additional review of previous literature. The Administration wished to claim that small increases in the minimum wage do not have injurious effects. The Administration's policy position was based significantly on the work of several academic economists using mostly small sample, before-and-after study approaches. Setting aside this approach (which will be critiqued further later), the general view is that the impact of minimum wage increases as of the 1990s was as follows.

- The minimum wage reduces employment. This effect is much more pronounced among teenagers (16-19) and youth (16-24) than adults.  
- The minimum wage reduces employment particularly among black teenage males and the unskilled and low-wage workers, and industries dependent on such labor.  
- The minimum wage can have persistent effects by causing employers to cut back on training and through use of labor-sparing technologies.  
- The minimum wage is not an effective means of addressing poverty.

Because there are various methods and sources of data that can, and have, been applied to the study of minimum wage regulations, there will never be 100 percent agreement on any issue in this field. Moreover, there are some subject areas that have been studied insufficiently to reach strong conclusions about the impacts. This is certainly the case regarding macroeconomic impacts—i.e., the impact of minimum wage regulation on the general rate of inflation, capital accumulation, economic growth, and related measures. These relationships may never be resolved because of the complexity of the economy, and the difficulty of isolating the effect of one, out of many, regulatory intrusions in the private economy and its labor markets.

The weight of the research and evidence regarding employment impacts makes the strongest statistical and policy case against minimum wage regulation. Thus, advocates and critics of minimum wage regulation have focused their research in the last two decades on quantification of this effect.

Neumark and Wascher, in their 2007 review paper and their related book, found reasonable consistency in the scale of impacts of changes in the minimum wage on changes in employment.

Table 2 presents the standard measure by which the impact of minimum wage hikes is often measured. Specifically, it reports the “elasticity” of employment with respect to changes in the minimum wage. An elasticity of -0.10, for example, is interpreted as follows.

- Because the sign of the elasticity is negative, this means that an increase in the minimum wage yields a decrease in employment.
- The -0.10 value means that for every 1 percent increase in the level of the minimum wage, the level of employment falls by one-tenth that amount (0.10 x 1 percent) or 0.1 percent.

Table 2 summarizes the results of U.S. meta-analyses as well as a multi-country study by the OECD. Although there is variation (especially for the OECD sample), the effect is invariably negative and relatively consistent in the size of the impact. Table 2 reports primarily state- and country panel econometric methods. For the U.S., overall, a 10 percent increase in the minimum wage will decrease employment by 1 to 3 percent, depending on the study and the population of interest. The OECD study, using annual time series data for a panel of nine countries (Belgium, Canada, France, Greece, Japan, the Netherlands, Portugal, Spain, and the United States) yields roughly similar findings. The elasticity for the teen population is generally higher than the U.S., depending upon the model formulation.
For subpopulations, especially non-white teen males, the literature has long suggested a higher sensitivity of employment to the minimum wage. Brown, Gilroy, and Kohen (1982), for example, in a 1982 synthesis of the empirical findings since 1970, found elasticities of -0.18 to -0.38 for teen non-white males. The same review found elasticities ranging from -0.05 to -0.77 for teen non-white females. Because these studies rely on survey data and selective gender groups from that survey, the sample sizes are small, and the model formulations are relatively simplistic. Nonetheless, all of the ranges summarized above have point estimates that pass standard statistical tests for significance.

This author, and many other economists, finds the direction and consistency of impact compelling, both theoretically and statistically. However, other researchers using different methods find different results. The two methods that tend to yield very different results are (1) the “before-and-after” approach as defined earlier and (2) recent studies that use a different data source and introduce controls for geographic variation that are more complex than the typical panel models.

### The Debate over the Size of the Employment Impacts

This author, and many other economists, finds the direction and consistency of impact compelling, both theoretically and statistically. However, other researchers using different methods find different results. The two methods that tend to yield very different results are (1) the “before-and-after” approach as defined earlier and (2) recent studies that use a different data source and introduce controls for geographic variation that are more complex than the typical panel models.

#### Before-and-after approach: Card, Katz, and Krueger

I turn first to the key “before-and-after” measurement approach results that stirred debate in the 1990s. It was facilitated by the fact that, whereas nominal federal and state minimum wage rates had been reasonably stable prior to 1990, federal and some state policy makers felt that it made good political sense to adjust the minimum wage upward, if only to reflect the effect of inflation.

- The federal minimum wage was increased from $3.35 per hour to $3.80 in 1990, and to $4.25 in 1991, resulting in a two-year increase of approximately 27 percent.

This created an opportunity for those who employ the “before-and-after” approach to study the impact of the changes in the federal minimum wage (which could be done across all 50 states and the District of Columbia) or use local data to study the effect of specific state changes. The studies performed by Card (1992), Card and Krueger (1994), and Katz and Krueger (1992) are important to discuss because they seemed to have found that either employment was not sensitive to increases in the minimum wage or, even more surprisingly, that in some cases employment increased in response to the higher minimum wage. The studies with the largest paradoxical effects (i.e., positive elasticities) were all narrowly focused before-and-after studies.

- The before-and-after design suffers from the assumption that impacts would all be found immediately after the increase in the minimum wage. In fact, of course, it is possible that employers anticipated the changes (from public policy discussion) and had already made changes or that it takes time for an employer to set higher prices, employ labor saving devices, or make staff termination decisions—the kind of actions that reduce employment over time.

- Several of the studies used surveys of before-and-after employment behavior from single industries or types of employers in specific locations. This is problematic because an increase in the minimum wage may disadvantage certain firms or locations more than others, shifting sales (and need for labor) among firms. This required introduction of control samples, a process that can make the findings idiosyncratic to the choices, development, and treatment of these control samples.

- Similarly, in a before-and-after design, it is hard to control for specific macroeconomic, market share, or other factors that are going on in the background. By comparison, in a panel design using aggregate data from many markets (states) with a long time-series of minimum wage and employment data, the time trends or state-specific effects can be handled more comprehensively and agnostically.

The Card, Katz, and Krueger studies, though advanced as the “new economics of the minimum wage,” have for these, and other reasons, been criticized for a variety of methodological problems. Most importantly, the surveys were prone to implementation issues that can predispose findings one way or another. Specifically, Brown (1995) criticized the Card et al. survey designs for vague
definitions and interpretations and other issues from the use
of telephonic inquiries. Neumark and Wascher (1995) went
farther, and re-evaluated the evidence of the New Jersey-
Pennsylvania study, using data based on actual payroll
records (rather than telephone survey responses) from 230
fast food restaurants in New Jersey and Pennsylvania. Not
only did the data not match that obtained from telephone
surveys, but “…[analysis using]…payroll data lead to the
opposite conclusion…a 4.6 percent decrease in
employment in New Jersey relative to the Pennsylvania
control group.” Kim and Taylor (1995), Deere, Murphy, and
Welch (1995) and others were also among the critics. Deere,
Murphy, and Welch concluded, for example, “…higher
minimum wages go hand-in-hand with substantial declines
in the employment of low-productivity workers. The
conventional wisdom remains intact.”24 Nevertheless, the
Krueger et al. studies continue to be cited by advocates of
minimum wage regulation.

**Heterogeneity concerns: Dube et al**

A long-standing approach in measuring the impact of the
minimum wage is through the use of panels or pools of
different states (or countries). This has the strong statistical
advantage of enlarging the number of data points that can be
studied for impacts of changes in the minimum wage. That
way, the relatively rare event of a minimum wage rate
change in one state, say, can be combined with the results
from a panel or pool of data for 50 states. However, some
argue that even finding a common effect across many states
is not dispositive because the states are exposed to different
economic forces. Perhaps this diversity (called
“heterogeneity” in statistical parlance) in other economic
forces creates a statistical illusion of an impact that is
discovered serendipitously.

If one believes that this issue is material, then it is a matter of
“controlling” for these other forces and thereby purging the
alleged bias introduced by ignoring the diversity of
background factors. Many studies, in fact, employ control
variables, yet the findings of adverse impacts persist.25
Indeed, the question of adequacy of control can become a
bottomless, statistical “rabbit hole” of complex,
hypothesized control issues.

In the last five years or so, some economists—most notably
Arindrajit Dube and co-authors—have postulated that
statistical control in minimum wage studies could be
improved by several, related means. Specifically, by using
employment data that is from finer geographies (e.g. county
level, instead of state level), and industry level, perhaps one
can obtain better statistical control in the diverse economic
setting in which minimum wage rate changes occur.26

- Dube et al argue that the finer geographic detail
  allows using as controls counties adjacent to the
  studied county facing a minimum wage increase.
  - This yields superior control because they assume
    that adjacent countries are more likely to be
    experiencing similar business cycle effects.
    Studying those “markets” that straddle
    jurisdictions with differences in minimum wage
    policy, they assert, provides better control for
    macroeconomic conditions. (This approach is
called a “border discontinuity” control design.)
  - They implicitly argue that data with finer industry
detail allows better focus on industries sensitive to
minimum wage regulation (e.g., the restaurant
industry) as well as the most likely affected
demographic (teenagers).
  - The Quarterly Census of Employment and Wages
(QCEW) is the primary source of data for the strand
of research of Dube et al. The QCEW data is
obtained from surveys of **businesses** – not
individuals, as is the case with the Current
Population Survey (CPS) data used in many other
minimum wage impact studies.

“[Monras] finds that low-skilled
workers tend to leave or avoid
moving to the jurisdictions that
increase minimum wages.”

In conclusion, Dube et al do not find the negative impact of
minimum wage hikes on teenage employment, found in so
many prior studies. If their refutation is taken literally,
wages at the lower end of the wage distribution, it would
seem, can be raised any arbitrary amount without fear of
evoking a harmful impact on job opportunities for the
targeted worker class. In economics parlance, the demand
elasticity for labor is zero, at least for teenage workers. If
correct, such a finding gives latitude to policy makers who
would directly manipulate the income distribution. This is a
prominent policy stance of the Obama administration and
some policy makers at the state-level.

Two rebuttals to this work were offered by Neumark et al.,27
focusing primarily on the use of the “synthetic controls.”

- Neumark et al. challenged the implicit assumption
  in this work that geographically proximate areas
  provide better controls, and provided evidence to
  the contrary. Also, the approach so narrowed the
  focus that Dube et al. could be accused of ignoring
  most of the data relevant to the question. Moreover,
  other approaches to disentangle the heterogeneity
  problem yielded higher negative elasticities, more
  strongly in line with the conventional view.28
• Overall Neumark et al. “...find little basis for [Dube et al.] analyses and conclusions, and argue that the best evidence still points to job loss from minimum wages for very low-skilled workers – in particular, for teens.”

Meanwhile, other observers continue to find strong, negative influences of minimum wage hikes on employment of vulnerable worker classes.39 Other observers of the literature argue that the modeling has become so complex that small changes in the model specification can change the implications materially. A paper by Monras (2015), for example, found that simply introducing the fact that workers can migrate (physically or by taking jobs in other jurisdictions) can influence the findings. She studies 331 minimum wage increase “events” in the U.S using a spatial competition modeling perspective. She finds that low-skilled workers tend to leave or avoid moving to the jurisdictions that increase minimum wages. When this is factored into the overall implication for employment, the negative impact of minimum wages is apparent.

This debate is likely to go on. In this author's view, there are interesting aspects of the debate that have gone relatively unexplored. In the next section, therefore, I turn to presenting the results of my own research. This not only supports the conventional view, but also extends the scope of the adverse impact that can be expected by political manipulation of wages.

“The fact that the immediate effect is small does not eliminate the possibility of a delayed...effect.”

THE AUTHOR’S RESEARCH: A DYNAMIC MODELING APPROACH

In this author's view, the recent literature by the Card et al. and Dube et al.—for reasons given earlier—fails to disrupt the findings of the larger literature. Indeed, any reasonable application of Occam’s Razor30 would dismiss these efforts out of hand for adding unsubstantiated complexity to obtain a contrary result. The reason that complexity often does not clarify scientific issues is because the complexity itself expands the concepts and data that need substantiation. Indeed, that is my interpretation of the dissonance in the ongoing debates between these authors and the likes of Neumark and his colleagues.

For this reason, my own research employs minimal model or data manipulation. It does, however, introduce techniques that have been generally overlooked.

• Many studies implicitly assume that the effect of a change in the minimum wage is manifest immediately after adoption of the increase. In this author's view, this abstracts from the fact that such increases (a) might be anticipated and not linked therefore to the date of implementation, per se and (b) that it may take time for employers to assess the impact of the increase and/or implement changes to accommodate the higher costs of labor.

• The use of the U.S. Census’ Quarterly Census of Employment and Wages (QCEW) as the primary source of data for the Dube et al. approach means that some impacts are unable to be studied. Because the QCEW is obtained from surveys of businesses, it has no way of knowing the unemployment or labor force participation status of non-workers. This is available only from CPS data that lacks the spatial grain to be integrated consistently with county-level employment data from the QCEW.31

• Measuring the impacts of minimum wage changes on, say, employment would be more persuasive if it occurred simultaneously with measurement of other logical sequelae, such as changes in workers' labor force participation status, unemployment status and/or their perceived wage environment. This, in my view argues for a multi-equation formulation of the minimum wage impact model.

• Further buttressing the rationale of incorporating lag effects, data source consistency, and model framework features just identified, is the need for a framework that can test for causality of relationships. It would be nice to know, for example, if the minimum wage is the causal factor that reduces employment and not just a serendipitous (or weakly-linked causal effect) via changes in labor force participation status. Additionally, it is possible that the timing and size of minimum wage changes are themselves influenced by labor market conditions.

• Finally, it would be nice to know how persistent are impacts of a permanent change in the minimum wage on the various measures of labor market behavior works exhibit. The fact that the immediate effect is small does not eliminate the possibility of a delayed or persistent effect. Thus augurs for using a fully dynamic model that can be run out into the future to reveal the persistence effects of one-time shocks.
The econometric technique that affords addressing all of the above issues is something called a Vector Autoregression (VAR) model. It allows all of the potentially intertwined worker behaviors to be mutually interrelated through lagged effects. It also can test the significance and direction of causality among these factors. Finally, simulation of such a model allows demonstration of marginal or cumulative persistence of a one-time shock over a multi-period future.

The downside of this approach is that it works best with a long history of behavioral variables. Fortunately, CPS data support both monthly resolution and state panel analysis (called panel VAR or pVAR). Both make it reasonable to explore this type of analysis.

The Modeling Approach

The VAR approach is used here because it allows study of the relationships among multiple, interrelated variables to be studied in an agnostic framework, and for the interrelationships to play out over time. The basic approach used here thus has the following features.

- Labor market measures are studied that I know, from theory, to be interrelated and therefore likely behave as a system rather than as isolated factors. In my case, I focus on the minimum wage rate, employment, labor force participation, the wage received, and unemployment.¹²

- The model formulation is relatively agnostic in its structure. That is, it does not assume a very rigid mathematical formulation of the relationship among these labor market factors. Rather, each labor market variable is allowed to affect all of the other variables.¹³ In addition, the equation explaining each measure is of identical, arithmetical form.

- The influence of one variable on another is allowed to differ depending upon how much time has passed since an influential variable changed in some fashion. In economics jargon, this means I allow for lagged effects of, say, the change in the minimum wage on the other market measures, and vice versa.

- To increase the opportunity to discover interrelationships, I use a large number of observations from a multi-state panel of data. Specifically, I study monthly measures of each variable across a panel of 50 states and the District of Columbia. In statistics parlance, this gives us a large number of observations with which to study impacts. As a result, there are over 20,000 observations available in the monthly version of my model.

Data Considerations

Unlike some other, recent analysts, I rely on conventional data sources and do not construct “synthetic controls,” or make other unusual selections or transformations of the data. As expressed earlier, it is my strong belief that complex transformations of data expose a study to the criticism that the transformations were selective. The following are all of the material features of the data used.

- The measures of labor market behavioral variables are obtained from the U.S. Census Current Population Survey (CPS).³⁴ This includes information on employment, unemployment, labor force participation and wages received as reported by survey respondents.

- Data on the relevant minimum wage, by state, at a given point in time is derived from others' assembly of this data, coupled with updates performed by the author from published government sources.

- Further variability is introduced by the use of “real” (inflation-adjusted) measures of both the minimum wage and the market wages reported in the CPS by survey respondents. The creation of real values is done using the Consumer Price Index (CPI).³⁵

- Because some states employ their own (higher) minimum wage rate, rather than the federal rate, the higher of the two is employed. This is consistent with the policy in place over my study period. If a state happens to have more than one minimum wage rate, the higher of the rates is employed for that state in the period at question.³⁶

- The VAR statistical procedures give the most reliable results when time-series data is represented not as “levels,” but rather as “changes” in the behavioral variables of interest. I treat the data accordingly.³⁷
All of the non-financial labor market variables are expressed as percentages of the population being studied. Thus employment, for example, is measured as the share of the study population that reports have a job in the CPS. This normalizes the data for the size of the market.

I now turn to the application of the VAR model to the youth population—individuals in the 16 to 24 age cohort.

**Application of the VAR Analysis to the Youth Population, 1979-2014**

The primary focus of the VAR analysis is the so-called youth population in the United States between 1977 and 2014. The youth population comprises individuals between the ages of 16 and 24. Although findings of minimum wage impacts are often found to be the most dramatic among the teenage (16-19) age cohort, the early accumulation of work experience and skill development goes on throughout the age span of the youth population.

In my view, therefore, the youth age cohort is especially relevant to an evaluation of minimum wage policy. Table 3 displays basic statistics regarding the key labor market variables available to the VAR analysis. The statistical findings after implementation of the VAR panel model are strongly supportive of the notion that increase in minimum wages has a meaningful, deleterious, and persistent effect on the youth labor market. Specifically, the findings from the VAR modeling are as follows.

**Increases in the Minimum Wage are Causally Related to Adverse Impacts**

The VAR approach allows testing for when the relationship between changes in the minimum wage and labor market behaviors is just a serendipitous correlation, or whether there is a causal link. This is established by applying the so-called Granger Causality Test to the VAR results. Doing so reveals:

- An increase in the minimum wage reduces youth employment. The contrary hypothesis is rejected resoundingly at the 99.9+ percent level of confidence. Although, not surprisingly, real market place wages and ambient labor force participation rates also influence youth employment, their individual effect is only one-fourth as significant as the minimum wage increases.

- An increase in the minimum wage reduces youth labor force participation. The contrary hypothesis is also rejected resoundingly at the 99.5 percent level of confidence. Changes in market wages and employment activity, in contrast, have no significant causal link to labor force participation. The blame for decreases in youth labor force participation, therefore, lies squarely at the feet of policy makers—not the marketplace.

- Causality testing also reveals that there is a statistically meaningful reverse causality link between changes in the labor force participation...
rate and changes in the minimum wage. This is possibly a political channel, whereby policy makers, seeing youth leaving the labor force incorrectly assume this is because of inadequate rates of compensation. They then turn to raising the minimum wage to encourage greater participation by youth when, in fact, this policy was the cause of youth exiting the labor force in the first place. No other factor is as causally linked to minimum wage policy at normal levels of statistical confidence.

**Increases in the Minimum Wage are Adverse and Persistent**

The VAR method allows one to “shock” the VAR model with a one-time arbitrary increase in the minimum wage and trace the impacts into the future. This is done using the “impulse response” feature of VAR modeling. This feature traces all of the myriad mutual interactions of all of the labor market variables in the model.

In my impulse response modeling, the minimum wage “shock” used is one standard deviation of the average percent change observed in the panel dataset (i.e., over time and across all of the states in the panel). By this measure, the shock to the real minimum wage used in the impulse response analysis is approximately a 5 percent *increase* in my dataset. (See Table 3.)

The impulse response analysis feature of VAR analysis thus can provide information about both the pattern of individual or *marginal* market reactions over time, or the *cumulative* effect of the drawn out reactions of employers. The figures that follow graphically portray how the impact of an upward shock to the minimum wage plays out over time on behaviors such as employment, labor force participation, and the market wage rates likely to be observed. Since my VAR model was built using percent change data, my impulse responses can easily be converted to “elasticities”—the same sensitive measures used for decades in minimum wage research.

I present first the trajectory of the marginal impacts over time, and then the cumulative impacts. The error bands around the trajectories are the widely used, two-standard deviation confidence intervals. The response trajectory length from the date of the minimum wage “shock” is 60 months (5 years) in all cases. Figures 1 to 3 are very informative, both as a group and for the individual labor market measures studied.

**General Findings**

- The impulse responses for all projections are non-zero and within the two-standard deviation error bands, indicating that the results are statistically meaningful using conventional significance criteria.

- The complex, lagged and mutual interaction discovered among the four endogenous labor market variables is stable. This is revealed by so-called unit root analysis, but is revealed in the graphics by lack of explosive or oscillating trajectories in the out-years of the projections.

- The direction and size of impact is consistent with the long-standing finding of adverse impacts of minimum wage hikes. The graphics reveal short-term elasticities that are generally consistent in value with typical before-and-after or non-dynamic panel impact modeling.

- In addition, for the first time, I see that the impact elasticities cumulate ominously many months after the initial minimum wage hike. This yields elasticities that can be several times the low impacts measured immediately after the change in the minimum wage rate, perhaps explaining why survey-based, before-and-after studies often find only modest impacts.

**The Impact on Employment**

Figures 1A and 1B display the marginal and cumulative elasticities of employment with respect to (“wrt”) changes in the minimum wage.

- In Figure 1A and 1B, it is interesting to note that the immediate impact (within a few months) is close to the elasticity rate reported in the conventional literature, as summarized earlier in Table 2. That is, elasticities in the range of -0.10 to -0.20 are revealed.

- Importantly, however, the VAR impulse response analysis suggests that, out 60 months or so when the impact of the shock has played out, the elasticity of employment with respect to the minimum wage
may be 5 to 10 times that size—with an elasticity of -1.0 within an error band of -0.8 to -1.1 or so.

- This is consistent with the recent findings of Monrasú (2015) who concluded from her analysis of minimum wage impacts that the local demand elasticity for low-skilled labor is -1.2, very close to my cumulative impulse response calculation.

- Large negative demand elasticities for low-skill workers have been found in numerous studies, and flow logically from such workers' low and undifferentiated productivity in the workplace. 42

Even the strongest advocates of the minimum wages in the 1990s, such as Alan Krueger, have in recent years become much less sanguine that the minimum wage can be increased materially without adverse effects. Although Krueger (2015) asserts that there is some “moderate” increase of the minimum wage that would not have significant adverse effects, he has criticized the scale of increases currently being proposed, including the $15 minimum wage that is being advocated by labor organizations. 43

The Impact on Non-Participation in the Labor Force

Figures 2A and 2B display the marginal and cumulative elasticities of youth choosing not to participate in the labor force. Because I am modeling withdrawals of youth from labor force participation, I expect the adverse impact elasticity of non-participation to have a positive sign with respect to an increase in the minimum wage.

- As Figure 2A and 2B reveal, a large elasticity is found even in before the adverse effect of the minimum wage has fully played out. That is, marginal or cumulative elasticities in the range of 0.12 to over 0.3 are revealed within the first few months after the minimum wage shock.

- The non-participation effect cumulates over time to approximately 0.7 after 60 months. Thus, like the employment impact, the adverse effects cumulate over time, although not as aggressively as do the employment impacts.

- The finding of a negative impact of increased minimum wages on labor force participation is consistent with the findings of Wessels (2005).
Figures 3A and 3B display the marginal and cumulative elasticities of the real wages received by youth with respect to the change in the minimum wage. My expectation is that an increase in the minimum wage will increase the observed, market average wage over time. This will occur because, in the short run, some of those enjoying the prior (lower) minimum wage will lose their jobs, leaving behind higher wage workers. Additionally, over time, the new lowest skilled workers in the youth cohort will receive the new, higher minimum wage.

Indeed, this is the effect observed in Figures 3A and 3B. The elasticity is unambiguously positive over the 60 month time period.

Figure 3A reveals that there is a sharp, but quantitatively small, increase in the marginal elasticity with the first six months or so, as some existing minimum wage workers lose their jobs and others receive higher real wages. After that period, however, the propagation of the higher minimum wage is likely dominated by the rate at which new low-skilled workers enter the cohort.

Figure 3B suggests that after 60 months, the average percentage real wage increase tends toward the percentage increase of the minimum wage shock. Put differently, an elasticity of approximately 1.0 is reached only five years after the shock. These results give little support to the oft-advanced notion that raising the minimum wage will quickly and dramatically push up wages of non-minimum wage earners because of institutional behavior factors.

The Impact on Average Real Wages

The Impact on Unemployment and the Unemployment Rate

There are no graphics portraying the impact on the share of youth who are unemployed because to do so in the model would introduce a redundant variable. This is because the share of the youth population that is unemployed is, by definition, equal to:

\[ \text{SHARE\_UNEMPLOYED} = [1 - (\text{SHARE\_NILF} + \text{SHARE\_EMPLOYED})] \]

In earlier sections, I showed that a minimum wage hike increases the share of youth not-in-the-labor force (SHARE\_NILF), but decreases the share employed (SHARE\_EMPLOYED). Thus, using the relationship just
presented, the direction of change in the share reported as “unemployed” in U.S. labor statistics is ambiguous. The share of youth that is unemployed after a minimum wage hike will go up if the share not-in-the-labor force rises by less than the share that is employed falls, and will go down if the relative shares not-in-the-labor force and employed are reversed.

Similarly, the impact of a minimum wage hike on the youth unemployment rates is ambiguous. This is because the unemployment rate is defined as the proportion of those in the labor force who are unemployed. This can be restated as:

\[
\text{UNEMPLOYMENT RATE} = \frac{\text{SHARE UNEMPLOYED}}{\text{SHARE IN LABORFORCE}} \cdot \frac{\text{SHARE UNEMPLOYED}}{\text{(1-SHARE NILF)}}
\]

The uncertain sign of the numerator of this expression makes the sign of the elasticity of the unemployment rate with respect to the minimum wage also ambiguous. In simulations made from the VAR modeling results I find that, for my sample data:

- The share of youth unemployed has a large positive elasticity with respect to the minimum wage—suggesting the share of youth unemployed increase with an increased minimum wage. The point elasticity is approximately 0.5. However, this estimate has large error bands that do not allow rejection of a zero elasticity.

- The impact on the unemployment rate, as defined above, is also likely positive. Indeed, simulations using the VAR results indicate a point elasticity of approximately 1.0. In my sample, with a mean youth unemployment rate of 12.6 percent, a 5 percent increase in the minimum wage would thus elevate that unemployment rate by 5 percent to 13.2 percent. As with the unemployment share, however, the large error bands do not allow rejection of a zero elasticity.

**IMPLICATIONS FOR ALL WORKERS**

The VAR method and formulation can be applied to other age cohorts. However, at least historically, individuals have moved quickly out of the low-skill, minimum wage setting as they aged. Being in the workforce at a young age confers skills on workers and allows them to learn how the market and employment environments function. Most studies find little impact of a minimum wage shock on the cohort of all working age individuals. My findings are similar, and reported briefly here.

**VAR Results for All Workers**

The VAR framework that was applied to youth was applied to all working age CPS respondents. This confirmed what other economists have found, namely a lack of statistically significant impacts of the minimum wage on workers as a whole. The VAR model applied to all working age individuals in general yields impact estimates that do not meet traditional criteria for statistical significance. Nevertheless, the sign and point estimates yield effects that are directionally consistent with most of the labor market indicators studied above.

- The point estimate elasticity of employment is negative, as observed in the youth sample and lower in the long run at -0.10 than was observed over 60 months for youth. However, at -0.10, the long-run elasticity suggests that higher minimum wages may impact the entire work force and not just youth.

- The tendency to leave the labor force after a minimum wage increase also has a positive long-run point estimate elasticity (of 0.26) that also would not be trivial if it were statistically robust.

- More ominously, the elasticity of the minimum wage on market wages has a negative point estimate over the entire 60 month impulse response trajectory, with a value of -0.08 consistently the first half-year or so after the minimum wage shock. One could interpret this as the “echo” of the workplace skills deprivation that the minimum wage imposes on youth early in their career. Since youth are included in all workers, a larger sample might reveal a larger, all-worker negative wage impact if more data were available.

It is important to re-emphasize that these point estimates do not meet the standards of a statistically significant finding. However, viewed together, it is worth considering that widespread (and currently, more aggressive, by historical
The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.

The youth employment share fell from almost 60 percent in 2002 to 45 percent 2014—a decline of 25 percent. The share of youth not participating in the labor force rose from about 30 percent to 45 percent over the same time period—an increase of about 50 percent. Over-indexing thus may have led to the loss of 32,000 and 31,000 youth labor force participants and workers, respectively, over the 2002-2014 period. Had the minimum wage been indexed to the trend in CPI-adjusted youth market wages instead of the CPI alone, these losses could have been mitigated.

Figure 4 is strongly suggestive of the possibility that the over-indexing of the minimum wage caused the share of the youth employed to decline, and the share of youth not participating in the labor force to rise. From 2002 to 2014, CPI-adjusted market wages for youth fell an average of 1 percent per year. Thus, adjusting the minimum wage by the CPI over-indexed the minimum wage relative to youth market wages.
Figures 5 and 6 display the adverse effects on youth employment and labor force participation, respectively, by tier. Constructing the likely statewide impact required weighting of the individual tier impacts.

Figure 5 reveals a statewide percent decline in the share of the youth population that is employed of almost 25 percent. Figure 6 reveals a 17 percent increase in the share of the youth population dropping out of the labor force.

Greater impacts are felt, of course, in the Portland metropolitan area where the real increases in the minimum wage are more aggressive than in other urbanized counties or the designated rural counties.

These impacts on the share of youth can be used to approximate the impact on individuals in the youth cohort. Table 5 presents state-level base year (2014) and forecast values through July 1, 2020, for the affect of SB 1532 on key measures of youth labor market conditions. The table also presents the cumulative impacts on Oregon’s youth population over the full phase-in period of SB 1532. The impacts are sobering:

- Under Oregon’s new law passed in 2016, another 52,000 Oregon youth will lose employment by 2022. This is over 22 percent of the 2015 youth labor force.
- Also, 63,000 more Oregon youth will withdraw from the labor force. This is over 26 percent of the 2015 youth labor force.
- If I combine these post-2014 losses with those estimated earlier from Oregon’s over-indexing of the minimum wage between 2002 and 2014, the
total losses of youth jobs is on the order of 83,000, and lost labor force participation totals over 94,000.

Considering that Oregon's youth population is not growing materially, and will have averaged about 430,000 over the 2002 to 2022 period, cumulative losses of this scale are dramatic. They mean that minimum wage policy has extinguished youth jobs and labor force participation of approximately 1 in 5 Oregon youth. Moreover, in 2023, when the graduated increases under the new law have all occurred, Oregon plans to return to the 2002 policy. Thus, youth employment opportunities will continue to erode due to continued—albeit at a slower rate—both delayed echoes of the 2016 law phasing and the return to the 2002 over-indexing regime.

Minimum wage policy is a testament to the potential risks of regulating market wages. Policy makers continue to expand the use of minimum wage regulation despite the strong theoretical and empirical indications that the likely negative impacts of the policy on youth employment and workplace experience building. One does not have to be 100 percent certain of these negative consequences to counsel caution.

It is also of concern to this author that the same entities that advocate for the policy later bemoan the youth employment crisis they may well have helped to create. The International Labor Organization, for example, has long been an advocate of the minimum wage, and has helped propagate its use to over 100 countries. They themselves recognize that the lack of youth employment has now reached an historical high and constitutes a worldwide crisis. Despite this, they seemingly turn a blind eye to the culpability of their own minimum wage policy advocacy. Indeed, the ILO's new agenda is, instead, to "[scale] up investments in decent jobs for youth." Exactly what these investments are, how they would be funded, and with what net impact is unstated.

The same biases are of concern in Oregon policy making. Indeed, the legislative sponsor of SB 1532 hailed its passage as “monumental” and “…why we were elected.” To this author, the risks of intrusion into market wage-setting mechanisms has thus far yielded something else—a monumental deprivation of youth employment and labor force participation experience. In the setting of a youth employment and labor force crisis, which the ILO itself has declared, SB 1532 has further impaired Oregon youth employment prospects.

CONCLUSION

Minimum wage policy is a testament to the potential risks of regulating market wages. Policy makers continue to expand the use of minimum wage regulation despite the strong theoretical and empirical indications that the likely negative impacts of the policy on youth employment and workplace experience building. One does not have to be 100 percent certain of these negative consequences to counsel caution.

It is also of concern to this author that the same entities that advocate for the policy later bemoan the youth employment crisis they may well have helped to create. The International Labor Organization, for example, has long been an advocate of the minimum wage, and has helped propagate its use to over 100 countries. They themselves recognize that the lack of youth employment has now reached an historical high and constitutes a worldwide crisis. Despite this, they seemingly turn a blind eye to the culpability of their own minimum wage policy advocacy. Indeed, the ILO's new agenda is, instead, to "[scale] up investments in decent jobs for youth." Exactly what these investments are, how they would be funded, and with what net impact is unstated.

The same biases are of concern in Oregon policy making. Indeed, the legislative sponsor of SB 1532 hailed its passage as “monumental” and “…why we were elected.” To this author, the risks of intrusion into market wage-setting mechanisms has thus far yielded something else—a monumental deprivation of youth employment and labor force participation experience. In the setting of a youth employment and labor force crisis, which the ILO itself has declared, SB 1532 has further impaired Oregon youth employment prospects.

Table 4: Oregon’s New Minimum Wage Policy (2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>Youth Population (000)</th>
<th>Youth Labor Force (000)</th>
<th>Labor Force (% of Population)</th>
<th>Employment (000)</th>
<th>Employment (% of Population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>438.0</td>
<td>246.0</td>
<td>55.99</td>
<td>204.0</td>
<td>46.34</td>
</tr>
<tr>
<td>2015</td>
<td>436.5</td>
<td>241.8</td>
<td>55.39</td>
<td>200.7</td>
<td>45.98</td>
</tr>
<tr>
<td>2016</td>
<td>435.1</td>
<td>236.8</td>
<td>54.44</td>
<td>196.6</td>
<td>45.19</td>
</tr>
<tr>
<td>2017</td>
<td>433.6</td>
<td>224.3</td>
<td>51.74</td>
<td>186.2</td>
<td>42.95</td>
</tr>
<tr>
<td>2018</td>
<td>432.2</td>
<td>213.7</td>
<td>49.44</td>
<td>177.4</td>
<td>41.05</td>
</tr>
<tr>
<td>2019</td>
<td>430.7</td>
<td>205.9</td>
<td>47.82</td>
<td>171.0</td>
<td>39.69</td>
</tr>
<tr>
<td>2020</td>
<td>429.3</td>
<td>197.5</td>
<td>46.01</td>
<td>163.9</td>
<td>38.19</td>
</tr>
<tr>
<td>2021</td>
<td>429.8</td>
<td>190.0</td>
<td>44.22</td>
<td>157.8</td>
<td>36.71</td>
</tr>
<tr>
<td>2022</td>
<td>430.3</td>
<td>182.9</td>
<td>42.51</td>
<td>151.8</td>
<td>35.29</td>
</tr>
</tbody>
</table>

CUMULATIVE YOUTH LOSSES FROM SB 1532 OVER PRIOR MINIMUM WAGE POLICY

<table>
<thead>
<tr>
<th>Year</th>
<th>Youth Population (000)</th>
<th>Youth Labor Force (000)</th>
<th>Labor Force (% of Population)</th>
<th>Employment (000)</th>
<th>Employment (% of Population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>NA</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>NA</td>
<td>4.2</td>
<td>0.6</td>
<td>3.3</td>
<td>0.4</td>
</tr>
<tr>
<td>2016</td>
<td>NA</td>
<td>9.2</td>
<td>1.5</td>
<td>7.4</td>
<td>1.1</td>
</tr>
<tr>
<td>2017</td>
<td>NA</td>
<td>21.7</td>
<td>4.2</td>
<td>17.8</td>
<td>3.4</td>
</tr>
<tr>
<td>2018</td>
<td>NA</td>
<td>32.3</td>
<td>6.5</td>
<td>26.6</td>
<td>5.3</td>
</tr>
<tr>
<td>2019</td>
<td>NA</td>
<td>40.1</td>
<td>8.2</td>
<td>33.0</td>
<td>6.6</td>
</tr>
<tr>
<td>2020</td>
<td>NA</td>
<td>48.5</td>
<td>10.0</td>
<td>40.1</td>
<td>8.1</td>
</tr>
<tr>
<td>2021</td>
<td>NA</td>
<td>56.0</td>
<td>11.8</td>
<td>46.2</td>
<td>9.6</td>
</tr>
<tr>
<td>2022</td>
<td>NA</td>
<td>63.1</td>
<td>13.5</td>
<td>52.2</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Source: The author from his own modeling and forecasts.
ENDNOTES

1. ILO (2014).

2. Connecticut, Delaware, Hawaii, Maryland, Massachusetts, Michigan, Minnesota, Rhode Island, Vermont, West Virginia, and D.C.

3. Alaska, Arkansas, Nebraska, and South Dakota.

4. Youth is conventionally defined as the cohort of individuals between the ages of 16 and 24.

5. In a 1995 survey conducted the University of New Hampshire survey center, 83 percent of economists held the view that a proposed increase would have negative effects on youth employment. https://www.minimumwage.com/2015/11/survey-of-us-economists-on-a-15-federal-minimum-wage/, retrieved April 6, 2016. In a more recent survey by IGM, an expert panel was asked specifically if, under a $15 dollar minimum wage in 2020, whether “the employment rate for low-wage US workers will be substantially lower than it would be under the status quo.” Only 24 percent disagreed or strongly disagreed. Thirty-eight percent were uncertain. Note that the question was not selectively posed for the youth age group. See, www.igmchicago.org/igm-economic-experts-panel, retrieved May 5, 2016.


7. It is now an agency of the United Nations.


12. In Figure 2, I generously assume that the regulator in the hypothetical monopsony context happens to set the minimum wage to exactly that which yields the same level of employment as in the efficient markets case. However, it is unclear that one can expect a bureaucracy to be prescient enough to not impose an excessively high wage floor.

13. In Friedman and Friedman (1979), pp. 227-228.


21. Brazen and Martin (1991), however, found very similar impact ranges for the youth subpopulation (in the range of -0.10 to -0.23) as did the U.S. studies, despite use of a single time series, rather than a panel model.

22. Card and Krueger found no negative effect of an increased minimum wage on employment. Rather, they found positive elasticities ranging from 0.0 to 0.20.

23. The largest positive elasticities with respect to the change in the minimum wage are found in the studies of New Jersey-Pennsylvania Fast Food Restaurants, Texas Fast Food Restaurants, and a study of California teenagers using comparison areas.


25. Panel data models also permit state-specific “fixed” effects, and effects that relate to trends in data.

26. As stated in Allegretto, Dube, Reich, and Zipperer (2013): “States in the U.S. with larger minimum wage increases differ from others in business cycle severity, increased inequality and polarization, political economy, and regional distribution.” Asserting the need to address such “kitchen sink” lists of controls raises the concern that the resulting research could be affected by the choice of control approaches.
This process is referred to as pre-whitening, and is designed to avoid the overstatement of statistical reliability than can occur when the variables of interest are strongly trended and, thus, correlated over time. Conversions of the levels to changes, or percent changes, removes a tendency for the VAR model to display more robust statistical effects than are appropriate. In my case, the percent change formulation is used to make it easier to compare my findings to the many prior studies. This is because “elasticities” of changes in labor market variables with respect to changes in the minimum wage are constructed from percent change measures. Monthly seasonality is addressed by computing the percent changes on a year-over-year basis, by month.

The Census internally uses a sample-weighting scheme in the CP process so that its findings are usable for making comparisons across states, and over time.

The VAR analysis that I report below had the following technical features. The variables used in the results reported below allowed joint (“endogenous”) determination of the Share Employed, Share Not in Labor Force, the real Minimum Wage in 2014 dollars, and the Average Wage in 2014 dollars. As noted earlier, the variables are used in their percent change form. Four lags are applied to each variable in every equation. The Wald method to test for lag exclusion effects was used to select this lag length. The stability of the VAR model was confirmed both by its revealed performance and by testing using the characteristic Unit Roots method.

In many economic systems, a one-time shock to the system can have persistent effects—much like the way the tsunami waves from a coastal earthquake take time to propagate. In a similar fashion, it may take employers some time after the initial minimum wage shock to react to that shock. Like the tsunami waves, a shock that depresses youth employment—albeit with declining potency as time passes—can also have effects that cumulate and persist over time. It may take employers an extended time to react, with changes in work rules, replacement of labor with capital, or to leave the market due to depressed profits.

Monrasú studied the impacts of minimum wages in a spatial, event-study formulation that linked the wage hike events to migration reactions.

Focusing on non-participation, as opposed to participation, in the labor force is in keeping with the approach of the CPS reporting the variable, NILF (“Not In the Labor Force”) for CPS respondents.
ENDNOTES  Continued

45. Those that lose their jobs will receive the true, market minimum wage, which is zero. However, the CPS data does not impute a zero wage to the unemployed. Thus, the average real wage has to rise.

46. As Table 3 shows, the average real market wage across the youth cohort is higher than the average real minimum wage by about 50 percent of the minimum wage.

47. For example, some believe in the “wage contours” notion, whereby relative wages fall within layers or “contours.” It is one of a number of “institutionalist” models of wage determination that argue that the internal wage-setting processes of employers, rather than “the market,” explain wage behavior. It was espoused by Dunlop (1957) and has been resurrected by Levin-Waldman (2015) in the contemporary minimum wage debate. Using a sample of all age groups, I find no statistical evidence that such “push up” effects occur.

48. The term “point estimate” refers to the value returned by the statistical analysis independent of its statistical significance.

49. ORS 653.025(2)

50. The index used is the U.S. City Average Consumer Price Index ("CPI") for All Urban Consumers for All Items.

51. Fruits (2009) studied the effect of CPI indexing practiced in Oregon and Washington depressed employment by about 10 percent in each state, or approximately 23,000 workers applied to average Oregon employment levels over that period. This is consistent with my findings measured over a longer time period.

52. In Krueger (2015) he asserts that, “…a $15 an hour is beyond international experience, and could well be counterproductive.”

53. Because county data on youth labor market conditions are not available due to small sample issues, Figures 5 and 6 use simple population weighting to derive the statewide impacts.


BIBLIOGRAPHY


BIBLIOGRAPHY Continued


BIBLIOGRAPHY  Continued


