



**Commuting on a Bus or with an Uber?: The High Cost for Females from  
Commuting on the Public Bus in Forsyth County, NC**

*CSEM Working Papers in Transportation Series, no. 2. July 2020*

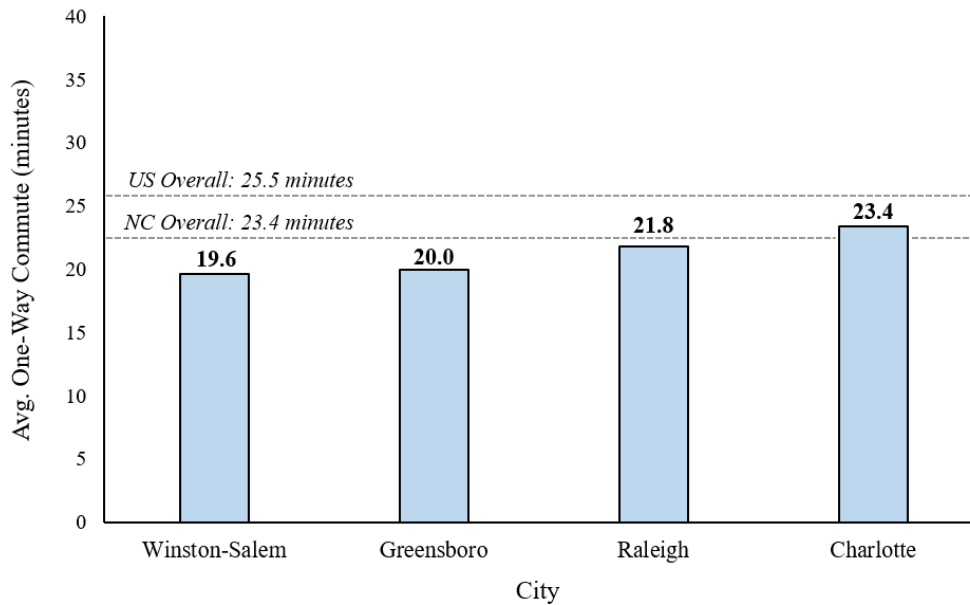
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## Introduction

In Winston-Salem, the county seat of Forsyth County, NC, it takes an average commuter around 19.6 minutes to drive to work.<sup>1</sup> Compared to other cities in the state, workers in Winston-Salem spend slightly less time commuting. For example, in Greensboro, the average commute takes around 20 minutes. In Raleigh and Charlotte, the average commute is around 21.8 minutes and 23.4.

**Figure 1. Commutes in Select North Carolina Cities**



minutes respectively (see Figure 1).<sup>2</sup> In Forsyth County overall, the average commute takes around 21 minutes.<sup>3</sup> This compares favorably to other counties in the state. In Guilford County, the average commute is 20.9 minutes. In Wake County, the average commute is 23 minutes, and in

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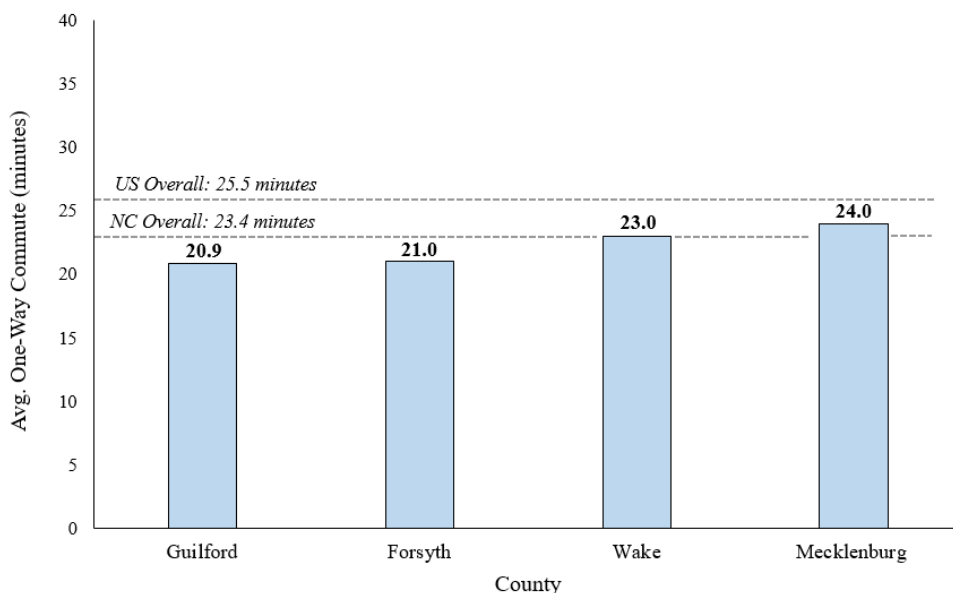
<sup>1</sup> These statistics were gathered from Data USA. The statistics regarding Winston-Salem, NC, in particular, can be found here: [Data USA Website](#). Depending on the source, estimates of commute times can vary. For example, according to the 2010 Census, the average commute time in Winston-Salem is around 20.2 minutes.

<sup>2</sup> The statistics for the cities of Greensboro, Raleigh, and Charlotte were gathered from Data USA, here: [Data USA Website](#). Depending on the source, estimates of commute times can vary. For example, according to the 2010 Census, the average commute times in Raleigh and Charlotte are around 19.2 and 25.1 minutes, respectfully.

<sup>3</sup> These statistics regarding Forsyth County, NC, in particular, can be found here: [Data USA Website](#).

Mecklenburg County, the average commute is 24 minutes (see Figure 2).<sup>4</sup> Indeed, the average commutes in both Winston-Salem and Forsyth County are shorter than those in North Carolina (23.4 minutes) and the United States (25.5 minutes) overall.

**Figure 2. Commutes in Select North Carolina Counties**



It would seem, then, that commuting in Winston-Salem and Forsyth County, NC is not a major challenge to workers, relative to other places. However, since these are averages and most commuters use personal vehicles, these metrics tend to mask the exorbitant amount of time that *bus riders* spend commuting to work. This paper seeks to highlight just how costly commuting on the public bus can be for workers in Forsyth County, NC, with specific focus given to female commuters, by showing that paying for an Uber may be a cheaper option. To demonstrate this, I estimate the economic costs associated with both transportation options (Uber or bus). As the

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<sup>4</sup> The statistics for the counties of Guilford, Wake, and Mecklenburg were gathered from Data USA, here: [Data USA Website](#). Depending on the source, estimates of commute times can vary. For example, according to the 2010 Census, the average commute time in Mecklenburg County is around 25.5 minutes.

reader will see, the total economic cost of using an Uber to commute to and from work may be less than that of using the bus.

### **Commuting with a Car versus a Bus**

The average employed bus rider in Winston-Salem spends around 66.8 minutes commuting to work (one-way).<sup>5</sup> Taking the commute back home into consideration, the average employed bus rider spends over 135 minutes a day getting to and from work.<sup>6</sup> The commute that takes only 15 minutes in car might take 1 hour and 15 minutes on a public bus, even though the actual distance from home to work is equal. With a personal vehicle, the commuter is able to avoid losing an hour of her time that would otherwise be spent simply getting to her workplace. Time is a valuable resource, one that can be used to get ahead, and, in turn, climb the economic ladder. Considering the amount of time required to use the public bus, time that could have been used for more enriching activities, like earning extra wages, spending time with family, or taking an extra class at the local community college, it stands to reason that the bus system does affect bus riders' ability to climb the income ladder. Hence, the public transportation system in Forsyth County, NC is an important factor to consider when studying economic mobility, which has been demonstrated in previous studies.<sup>7</sup> It is critically important, too, to recognize that those who commute in a personal vehicle and those who commute with the public bus are experiencing one of two different *kinds* of

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<sup>5</sup> Blizard, Z. 2018. Economic Mobility in Winston-Salem/Forsyth County, NC: A Closer Look into Employed Bus Riders' Lives, Ambitions and Missed Opportunities to Climb the Economic Ladder. Center for the Study of Economic Mobility Working Paper. [Center for the Study of Economic Mobility Website](#); Richardson, C. 2019. Why is Economic Mobility So (Surprisingly) Low in North Carolina? Center for the Study of Economic Mobility Policy Brief. [Center for the Study of Economic Mobility Website](#).

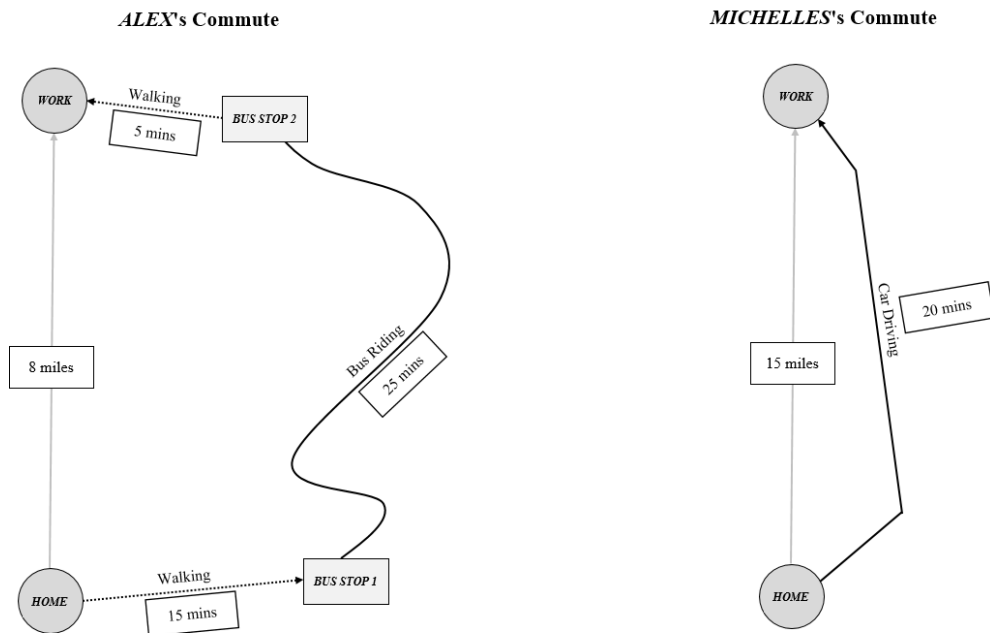
<sup>6</sup> *Id.* at 5.

<sup>7</sup> *Id.*; Blumenberg, E., & Pierce, G. (2014). A driving factor in mobility? Transportation's role in connecting subsidized housing and employment outcomes in the moving to opportunity (MTO) program. *Journal of the American Planning Association*, 80(1), 52-66; Thakuria, P., & Metaxatos, P. (2000). Effect of residential location and access to transportation on employment opportunities. *Transportation Research Record*, 1726(1), 24-32; Tomer, A., Kneebone, E., Puentes, R., & Berube, A. (2011). Missed Opportunity: Transit and Jobs in Metropolitan America. Report produced by Brookings; Kaufman, S., Moss, M. L., Tyndall, J., & Hernandez, J. (2014). Mobility, economic opportunity and New York City neighborhoods. NYU Wagner Research Paper No. 2598566.

commute distances. Therefore, prior to calculating the economic costs, it is important to get an idea of what a commute *looks like* from a bus rider's, compared to a car user's, vantage point.

To understand how a commute might be perceived differently by a bus rider, compared to a car user, a distinction must be made between two kinds of distance. These two kinds of distance will be referred to as Actual Commute Distance and Relative Commute Distance. The former is the actual geographic distance from a commuter's home (*HOME*) to a commuter's job (*JOB*). The latter is the relative distance from a commuter's home (*HOME*) to a commuter's job (*JOB*). Meaning, this is the amount of time it takes for a commuter to get to work from her home, regardless of the actual distance between the two points. To illustrate (see Figure 3): Commuter, *ALEX*, lives at location *HOME* and

**Figure 3. Illustration of Actual vs. Relative Distance**



works at the location *WORK*. The Actual Commute Distance for *ALEX* is 8 miles. Hence,  $|HOME - WORK| = 8$  miles. However, *ALEX*, does not own a personal vehicle, and the street routes from *HOME* to *WORK* are not linear and are very curvy. *ALEX* uses the public bus to get to *WORK*. It

takes *ALEX* around 45 minutes to get from *HOME* to *WORK*. Thus, the Relative Commute Distance is 45 minutes. Commuter, *MICHELLE*, lives at location *HOME* and works at location *WORK*. The Actual Commute Distance for *MICHELLE* is 15 miles. Hence,  $|HOME - WORK| = 15$  miles. However, *MICHELLE*, owns a personal vehicle, and the street routes from *HOME* to *WORK* are linear and very straight. *MICHELLE* uses the personal vehicle to drive to *WORK*. It takes *MICHELLE* around 20 minutes to get from *HOME* to *WORK*. Thus, the Relative Commute Distance is 20 minutes. Even though *ALEX* lives closer to the place of employment, the distance feels much greater to *ALEX* because *ALEX*'s commute is longer than *MICHELLE*'s commute. Thus, the two diagrams above illustrate an important phenomenon. Even if a particular commuter lives geographically closer to her job, without a car the time it takes to get from home to work may be more than someone who lives geographically further away but owns a vehicle. In this day in age, especially in the United States, 8 miles is not a large distance to traverse. However, for some people, 8 miles can be a very large distance to cover. Without a personal vehicle, well-designed routes, or efficient public transit services, the Relative Commute Distance can be disproportionality larger than the Actual Commute Distance.

### **Differential Impact of Commuting on Commuters**

This distinction between types of commute distances, and their differential impact on a commuter, have been previously explored in a study by the Center for the Study of Economic Mobility (CSEM).<sup>8</sup> This study found that employed female riders tend to earn lower wages as they commute further for jobs. Blizard and Richardson (2019) coined this the “Commuter Penalty.”<sup>9</sup> Thus, in addition to lost wages from lost time, female commuters are penalized for long commutes

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<sup>8</sup> Blizard, Z. and Richardson, C. 2019. The Cost of Long Commutes: How do Female Bus Riders Fare Differently? The Case of Forsyth County, NC. Center for the Study of Economic Mobility Policy Brief. [Center for the Study of Economic Mobility Website](#); Blizard, Z. and Richardson, C. 2020. The Cost of Long Commutes: How do Female Bus Riders Fare Differently? The Case of Forsyth County, NC. *Academy of Business Research Journal*, 1.

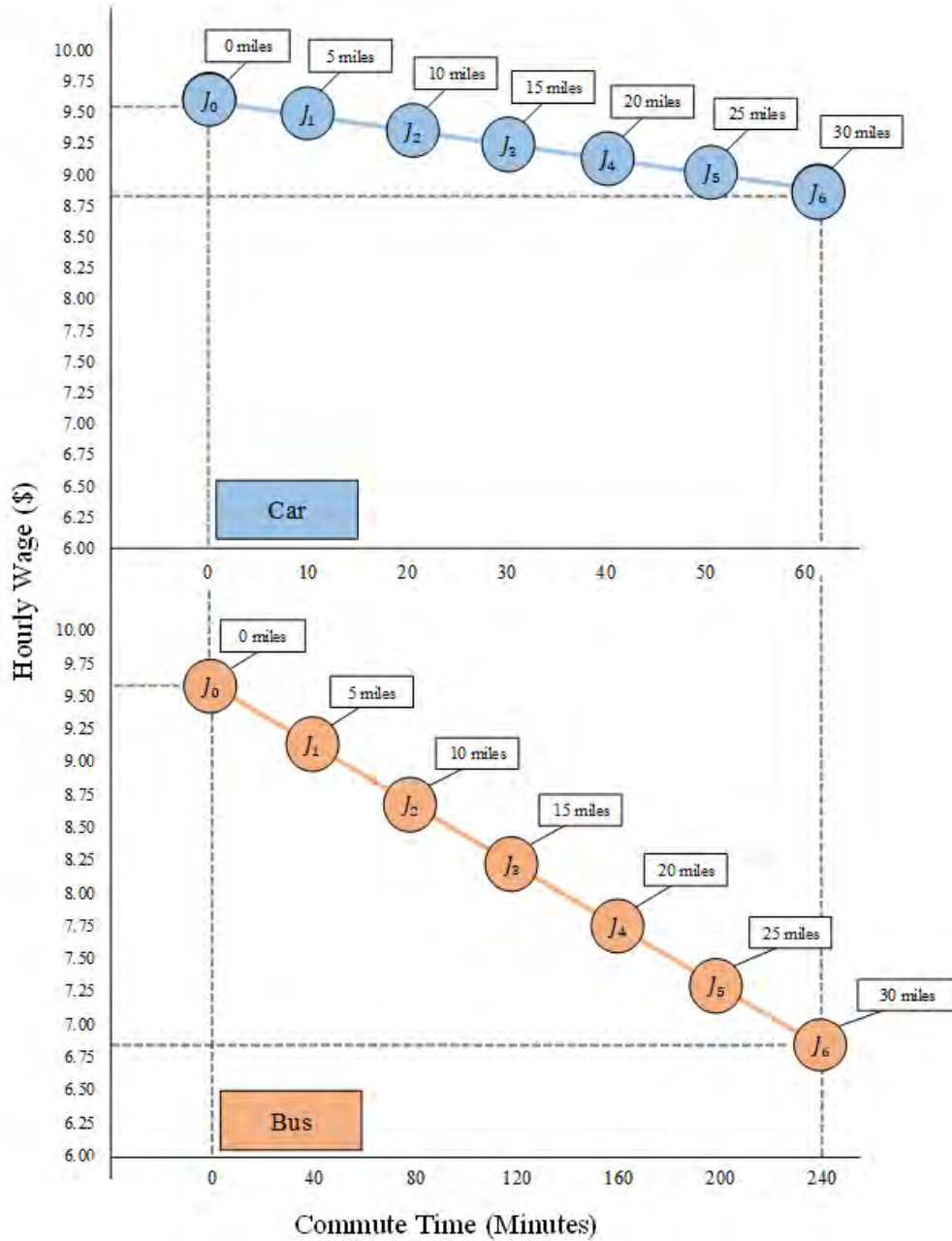
<sup>9</sup> How the “Commuter Penalty” was found and measured is described in detail in Blizard and Richardson’s paper.

with lower earned wages. If they were able to avoid this penalty by having shorter commutes, they may have been able to earn a higher hourly wage.

As argued by Blizard and Richardson (2020) females more typically shoulder a “double burden” of family and work, as compared to males. As a result, females in the labor market may prize flexibility in hours, closeness to shopping areas and other non-monetary benefits. Hence, they are likely to take cuts in their wages as a tradeoff for these benefits. Since they are focused on finding jobs that are more “family friendly,” they may need to expand their search from adjoining neighborhoods because the job qualities they desire are less common. In doing so, they may choose jobs that pay less but offer amenities such as more flexibility and child care. These jobs are also likely to be located further away from their homes. For males, if they are focused principally on maximizing wages, they will seek a higher wage to compensate for the cost of longer commutes. Therefore, their expected wage increases with longer commutes. Unlike females, males are unlikely to face a “double burden” of work and family and, hence, do not take a pay cut.

This phenomenon is further fleshed out here, with an illustrative example (see Figure 4).  $J_0$  through  $J_6$  represent unique job opportunities for a representative female job seeker.  $J_0$  is a job opportunity that requires a zero minute commute (with either a bus or a personal vehicle). As the subscripts on  $J$  increase from 0, 1, 2, ..., the job opportunity resides further and further away. However, the commute time to these jobs differ depending on whether the female job seeker uses a personal vehicle versus a public bus. For instance,  $J_6$  is the furthest job opportunity away from the female job seeker. With a personal vehicle, she spends around 61 minutes a day commuting to and

**Figure 4. Differential Female “Commuter Penalty”**



from  $J_6$ . However, if she uses the public bus, she will spend around 240 minutes a day commuting to and from work. Blizard and Richardson (2019) found that a female commuter is penalized around \$0.01 for every additional minute she spends commuting to and from work.<sup>10</sup> Hence, her

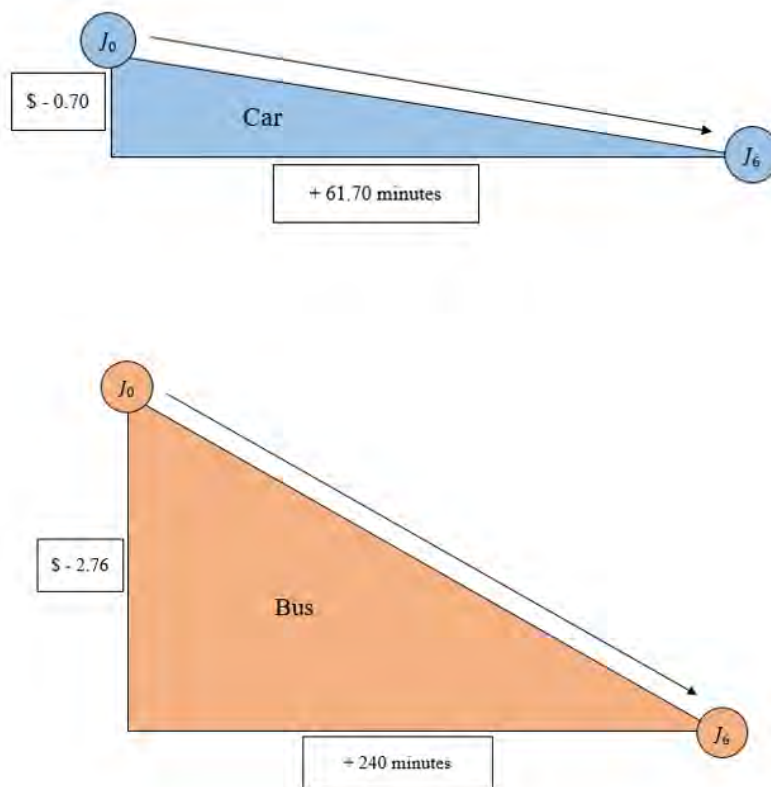
<sup>10</sup> *Id.* at 7.



earned hourly wage falls as she extends her job search to cover wider and wider distances, which require longer commutes. Nevertheless, with a vehicle, many of these long distances can be navigated quickly, compared to a bus. Consequently, the wage penalty the female job seeker faces is smaller if she can reduce the relative commute distance with a personal automobile.<sup>11</sup>

The diagrams in Figure 5, which are extracted from Figure 4, show that reaching the same job can require a substantially different amount of time, depending on whether the commuter has a car (rides an Uber) or relies on the public bus. A female commuter with a car (in an Uber) drives (rides) 61.70 minutes to reach a job, and she takes a \$0.70 cut in hourly wage. A female commuter

**Figure 5. Penalty from Commuting with a Bus or Uber**



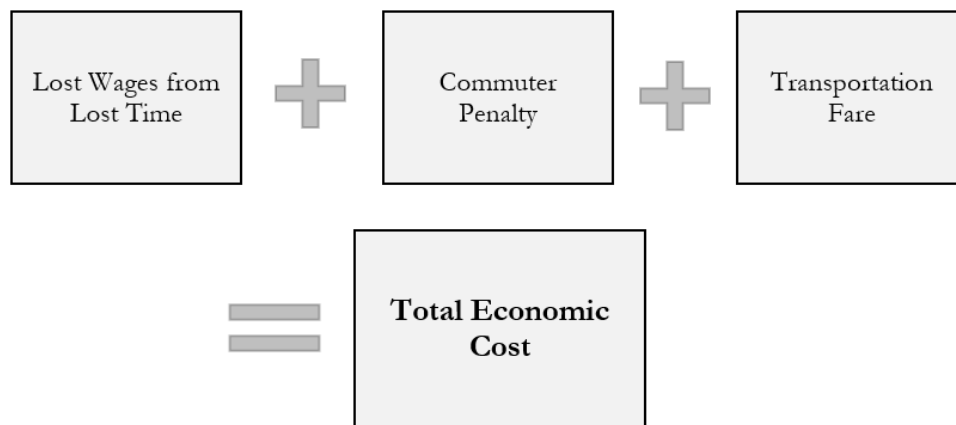
<sup>11</sup> Riders were asked in the survey what their commute would be if they had a personal vehicle, which I use as a proxy for an Uber commute. If the estimate that every minute spent commuting for a female results in \$0.01 deduction from earned wages is taken as given, it then becomes possible to compare the different penalty rates between commuting with an Uber versus a bus.

without a car, who relies on the bus, travels 240 minutes to reach the same job, but takes a \$2.76 cut in hourly wage.<sup>12</sup>

## Methods and Results

The costs discussed above (lost wages, “Commuter Penalty”) comprise two of the three components of the overall economic cost equation for a female commuter (see Figure 6). The last component, is simply the fare she pays to use a particular transportation option. With these three

**Figure 6. Calculating Total Economic Cost**



components, it then becomes possible to estimate the economic cost associated with commuting with the bus versus an Uber, for the average female commuter in Forsyth County, NC. I break down the cost calculations into three sections, corresponding to the three components of economic cost.

### 1. Lost hourly wages each week (from lost time):

The average employed female bus rider in the sample spends 11.61 hours a week commuting to and from work.<sup>13</sup> She makes around \$9.91 an hour. Thus, if she could use those hours to

<sup>12</sup> Using data gathered from CSEM’s Bus Rider Survey, I was able to estimate the ratio of a car commute to a bus commute

<sup>13</sup> The sample consists of 51 female commuters. In CSEM’s original survey, there were approximately 90 employed female bus riders that were surveyed. However, only 51 reported that they had used an Uber to commute before, and were able to provide the cost of the Uber ride.

work, instead of waste, she could earn more each week. By taking the product of the number of hours spent commuting on the bus and hourly wage for each rider, and then averaging the result, the outcome shows that the average female bus rider loses out on \$113.29 each week. The same procedure can be done for commuting with an Uber. Take the product of the number of hours spent commuting in an Uber and hourly wage for each rider, and then take the average, the result reveals that the average female commuter would only lose out on \$24.62 each week.

2. Weekly transportation fares spent to and from work:

Public bus rides in Winston-Salem, NC cost \$1. Hence, a trip to and from work costs a female commuter \$2 a day. In their survey, CSEM asked bus riders whether they had ever taken an Uber to work and how much the ride cost. The average female bus rider reports that her Uber ride from her home to work cost around \$12.68. Assuming the ride from work back home would cost the same amount, using an Uber to commute to and from work would cost around \$25.36 a day. If we take the product of the number of days in a week worked and the cost of using an Uber to commute to work for each rider, then take the average, the results shows that the average female commuter would pay around \$135.83 a week in fares. The same calculation for riding the public bus shows the average weekly cost to be around \$10.86.

3. Lost weekly wages from “Commuting Penalty”:

As has already been stated, Blizard and Richardson found that for every additional minute spent commuting, female bus riders in Forsyth County, NC tend to make around 0.12% less per hour. This is like earning \$0.01 less for every additional minute spent commuting to and from work. When converted to hours, this is equivalent to earning \$0.69 less for every additional hour spent commuting to and from work. As a result of this penalty, the average female commuter loses around \$49.94 every week. If she were to use an Uber, instead of the

bus, the average female commuter would only lose around \$10.17 as a result of the “Commuter Penalty.”

Sections 1, 2, and 3 above calculate the three parts of the weekly economic cost of commuting to and from work, with a bus versus an Uber. The average female commuter in Winston-Salem, NC faces a total weekly economic cost of commuting to and from work with a public bus of approximately \$174.09. On the other hand, if she were to use an Uber, she would face a total weekly economic cost

**Figure 7. Total Economic Cost of Bus Rider vs. Uber Rider**



of approximately \$170.62 (see Figure 7). Therefore, using an Uber might be the better commuting option in terms of minimizing economic costs. This is undoubtedly a surprising and counterintuitive finding, since paying for an Uber is expensive. However, as we have seen, the cost of lost time can be even more expensive. The reader might wonder whether this conclusion changes if it is assumed that female bus riders have bus passes, instead of having to pay \$1 per trip?<sup>14</sup> Assuming this, the average female commuter in Winston-Salem, NC faces a total weekly economic cost of commuting to and from work with a public bus of approximately \$170.15. Thus, the bus becomes the cheaper option by only \$0.47.

<sup>14</sup> A 30-day bus pass costs \$30. So, the pass costs around \$7.50 a week. Winston-Salem, NC bus fare prices can be found here: [Winston-Salem Transit Authority Website](#).

In a similar manner, it is possible to estimate avoided economic costs at various time horizons. Earlier, it was found that on average, a female rider could avoid approximately \$3.47 a week if she used an Uber, instead of the bus, to commute to work. This amount may seem minimal, but it adds up over the course of time (see Table 1). In a month (4 weeks) of using an Uber instead of the

**Table 1. Costs Avoided Over Time, by Using an Uber**

Scenario	Economic Cost: Bus	Economic Cost: Uber	Economic Cost Avoided
Week	\$174.09	\$170.62	\$3.47
Month (4 weeks)	\$696.36	\$682.48	\$13.88
Year	\$8,356.32	\$8,189.76	\$166.56
5 - Year	\$41,781.60	\$40,948.80	\$832.80
10 - Year	\$83,563.20	\$81,897.60	\$1,665.60

bus, the rider would avoid an economic cost equal to \$13.88. Extend this out to a full year (12 months), and the rider avoids around \$166.56. In 5 years, this adds up to \$832.80, and in 10 years, this adds up to around \$1,665.60. The latter two time horizon scenarios (5 years and 10 years) are simply for demonstrative purposes. Still, even though the cost avoidances may seem minimal, they likely do not feel that way to the average female rider in Forsyth County, whose annual income is under \$20,000.<sup>15</sup> It is important to note that this places the average employed female rider under the living wage threshold.<sup>16</sup>

<sup>15</sup> *Id.* at 5.

<sup>16</sup> According to Dr. Amy Glasmeier’s Living Wage Calculator at MIT, the living wage of a single adult with zero children living in Forsyth County, NC is estimated to be \$11.24. Assuming a 2,080 hour work year, this means the living annual income for these individuals around \$23,379.20. This estimate was found at: [MIT Website](#).

There are some assumptions involved in the calculations. First, I assume that the bus riders would be able to work the additional hours if they wanted to and that they would use all of their saved hours to work. It is of course possible that extra hours would not be available, or that a female commuter might use her saved time for other activities (family/friend time, relaxing, school, etc.) instead of working. Second, I assume that Ubers would always be available to use for these bus riders. Third, I assume that the Uber fare would be roughly the same for these riders, even though, based on the hypothetical scenario, demand for Ubers would increase, leading to higher Uber fares. However, this would only be a short term reaction, because more Uber drivers would likely enter the market as a result of the increased demand for rides, which would then drive fares back down. There are some benefits that I do not incorporate into my calculations. For example, if a bus rider already works full-time but wants to use her saved hours to work, she would likely earn overtime pay and not just the flat wage rate. Consequently, I am underestimating this aspect of costs avoided. If a bus rider continued to work extra hours and perform well in her duties, her hard work would get more recognition by her boss and coworkers. This, in turn, might increase the probability that she earned pay raises and/or promotions.

### **Discussions and Policy Implications**

Bus riders in Winston-Salem, NC spend an exorbitant amount of time commuting to and from work. Considering the value of time, they are losing out on critical opportunities to get ahead and climb the income ladder. This appears to be even more difficult for female bus riders since they face additional costs stemming from the “Commuter Penalty.” The economic cost of using the public bus can be so great that paying for an Uber may in fact be less costly because of the amount of time it would save, which could be used to work extra hours. Considering these costs,

government and business leaders ought to consider strategies to reduce them, like other cities are doing across the United States.

In April of 2018, Charlotte Area Transit System (CATS) in Charlotte, NC announced a pilot program involving Lyft with the objective of better connecting riders to jobs and education opportunities, which are unreachable by public transit.<sup>17</sup> Customers are offered subsidized rides each month, with CATS making a contribution each trip.<sup>18</sup> Transitions between bus stops or from last stops to destinations can be the most challenging part of a commute, hence, this strategy will be invaluable to individuals without personal vehicles. Findings by Boarnet, Giuliano, Hou, and Shin (2017) suggest that the partnership between CATS and Lyft will be successful, especially for Charlotte’s lower-income residents.<sup>19</sup> These researchers find that the means of “access and egress to and from stations is more effective at improving transit access to low-wage jobs than policies that reduce transit wait time or improve service headway.”<sup>20</sup> A similar public-private partnerships is occurring in Pinellas County, Florida. The transit authority there provides qualified low-income residents free Uber rides between 9pm and 6am. Participants receive over 20 free Lyft or Uber rides each month.<sup>21</sup> Many low-income residents, without personal vehicles, cannot take advantage of income opportunities that occur during hours in which public transportation is less accessible, such as off-peak hours late in the evenings and through nighttime hours. Therefore, Pinellas County’s program will bridge this gap, making it possible for these residents to reach these extra-income opportunities.

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<sup>17</sup> Schwieterman JP, Livingston M and Van Der Slot S (2018) Partners in transit: A review of partnerships between transportation network companies and public agencies in the united states. Report, Chaddik Institute for Metropolitan Development at DePaul University.

<sup>18</sup> *Id.* at 15.

<sup>19</sup> Boarnet MG, Giuliano G, Hou Y and Shin EJ (2017) First/last mile transit access as an equity planning issue. *Transportation Research Part A: Policy and Practice*, 103: 296-310.

<sup>20</sup> *Id.* at 17.

<sup>21</sup> *Id.* at 15.

Winston-Salem’s transportation system, like others throughout the country, follows a hub and spokes route model. This model necessitates that a city’s central bus station be located in the urban core and that all bus routes flow through it. This model design made sense when major employers primarily located in downtown and urban core areas.<sup>22</sup> However, major employers are now primarily locating to suburban areas. Some cities recognize this mismatch and are now deserting the classic model, like Tallahassee, Florida. StarMetro, the public transit authority in Tallahassee, has overhauled their routes to address this mismatch.<sup>23</sup> StarMetro’s goal is to connect riders to where they need to go, from their homes to work, as efficiently as possible.<sup>24</sup> A study by Brown and Thompson (2008) show that if Metropolitan Atlanta Rapid Transit Authority (MARTA) were to redesign bus routes to address the decentralization of employment hubs, their ridership levels would actually increase.<sup>25</sup> Not only that, this redesign would better connect people without vehicles to previously inaccessible job opportunities.<sup>26</sup> This spatial mismatch between potential workers and employers has been highlighted in recent studies, such as those by Madjd-Sadjadi and Zeoli (2019), and Smith and Blizard (2019).<sup>27,28</sup> Hence, by redesigning bus routes to directly link vehicle-less people from their homes to employment hubs, they not only save them time but are also connecting them back in to valuable economic opportunities. The city of Winston-Salem should strongly consider this approach. Additionally, WSTA has reported that ridership is decreasing. If they were to redesign routes with the focus of efficiently connecting people to where employers are located, this would both promote upward economic mobility and increase WSTA’s

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<sup>22</sup> Brown JR and Thompson GL (2008). The relationship between transit ridership and urban decentralization: insights from Atlanta. *Urban Studies* 45(5-6): 1119-1139.

<sup>23</sup> Badger E (2011) Decentralizing Bus Routes in Tallahassee. Citylab. Available at: [CityLab Website](#) (accessed 15 August 2019).

<sup>24</sup> *Id.* at 22.

<sup>25</sup> *Id.* at 20.

<sup>26</sup> *Id.*

<sup>27</sup> Madjd-Sadjadi, Z. and Zeoli, M. 2019. The Importance of Place Prosperity in Economic Mobility: An Examination of Occupational/Industrial Mismatch in Forsyth County. *Political Economy in the Carolinas*, 2: 29 – 60.

<sup>28</sup> Smith, Russell and Blizard, Z. 2019. Equality of opportunity?: Exploring the relationship between urban form and economic mobility in Forsyth County, NC. Center for the Study of Economic Mobility Policy Brief.



ridership. By capturing more riders, WSTA earns more revenue. This would also spark greater economic activity by better connecting employers facing talent scarcities to viable candidates that were previously unreachable. Hence, such a strategy can result in a “win-win-win” scenario between the three major societal players – businesses, individuals, and governments.

### **Conclusion**

There is a high cost associated with commuting with the public bus in Forsyth County, NC. This cost is even higher for female bus riders. There are policy options and strategies available that reduce the unintended costs associated with commuting, which will not only benefit employed female bus riders, but potentially all bus riders in the county.