



The Effects of Gas Prices on Single Mothers' Time Use

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Parents' time use has serious repercussions on both the cognitive and social development of their children. This is especially true for single mothers, as they must dedicate time to both market work and childcare. They are faced with constraints on two fronts: an income constraint caused by being the sole "breadwinner" and a time constraint caused by the lack of an additional family member to take care of necessary household duties, including caring for children. Single mothers often live on the edge, earning just enough to provide for themselves and their children on a day to day basis. Therefore, one would expect their time use choices to be relatively sensitive to price changes, especially to changes in gasoline prices.

Transportation is a necessary component of many activities, and, for that reason, so is gasoline. Since 2003, gas prices have become increasingly unstable; their growth and decline has, at times, been completely unpredictable. Due to their budget constraints, there is reason to believe that this volatility has caused changes in the time use choices of single mothers. Depending on the price of gas, a quick trip to the grocery store or to the playground may, at times, not be economically feasible for certain single mother households. Therefore, understanding the responsiveness of single mother's time allocation to changes in gas prices is particularly important, as this also impacts the well-being of the mother and her family. If gas price increases cause single mothers to work more and spend less time with her children, then one could expect this to have serious impacts her children's development and future opportunities. Hence, the time choices of single mothers are key not only to her own welfare but also to the current and future welfare of her children.

The purpose of this paper is to determine the relationship between changes in gasoline prices and the allocation of single mother's time. Specifically, the hypothesis is that these changes impact single mothers' choices to work and devote time to child care activities; gas prices are presumed to increase a mother's time in paid employment and thus decrease the time she allocates to caring for her children. This paper will first review relevant literature and then explain the data and the econometric model. Next, the results will be reported, followed by a discussion of these results and a conclusion.

I. Literature Review

The time use of mothers' is often examined with regard to the impact it has on their children's current and future welfare. Children who spend a significant amount of time with their family are thought to be better off (Kalenkoski, Ribar, and Stratton, 2005). Over the past few decades, an increasingly large number of mothers have chosen to enter the labor force, and a growing number of families are non-traditional (single-parent and cohabiting); these trends indicate that the amount of time children spend with their parents has decreased. For these reasons, the time use of single mothers is pertinent to study, due to the choice between child care and market work, and the budget constraints they face as a single parent; both of these can diminish the amount of time she devotes to her children.

A child's well-being and development is obviously correlated with the amount of time she spends with her family, and the direct care received from her mother. In their study, Hofferth

and Sandberg (2001) utilize time diary data from 2,818 children (obtained from the 1997 *Child Development Supplement* to the *Panel Study of Income Dynamics*) to determine the impact of family characteristics on children's time use, and the impact of children's time use on their achievement and behavior. Controlling for various family characteristics, they found that children (aged three to twelve) who spend more time with their family (specifically at meal time) score higher on letter-word and applied problems. In addition, these children also had fewer problem behaviors (namely less aggressive behavior), as they had a greater opportunity to talk through problems with their parents.

Although additional studies have not directly linked time use and children's behavior and achievement, several have linked parent employment status and involvement to children's outcomes. Milne et al.'s (1986) study separates family background variables from mother's employment, to determine how their employment affects children's achievement, measured using both reading and math test scores. Using cross-sectional data on both elementary and high school students, they find strong evidence that maternal employment has a negative effect on both math and reading achievement (although these results were consistent only for white, two-parent families). Muller's study (1995) linked maternal employment and mathematics achievement. Her results suggest that the higher test scores found among children of part-time and non-employed mothers are due to the increased unsupervised time after-school among children of mothers who work full-time. Other research, however, suggests that maternal employment, especially for single-mother families, can have positive effects on children, mainly due to the increase in income when mothers work more (Harvey, 1999; Milne et al., 1986). Therefore, although spending time with parents generally has a positive effect on children's behavior and achievement, for low-income families, maternal employment can raise children's well-being through the benefits of a higher family income.

Single mothers have a strict time constraint, unlike married women, who are found to have more flexible time allocation choices in previous literature (Sanik and Mauldin, 1986; Kimmel and Connelly, 2007), as they have the option of relying on another adult, namely their husband, to undertake certain activities. A married woman also appropriates less time to paid work and more time to child care, on both weekdays and weekends, and spends more time doing household labor on the weekdays, probably because having an additional adult in the household reduces the need for paid work (Kimmel and Connelly, 2006). Single mothers do not have the option of relying upon an additional adult and therefore must depend solely upon themselves to assume all of the household activities, in addition to earning enough money to support her family.

In addition, other family characteristics determine mothers' choice between time spent on child care and market work. A higher family income is positively associated with the amount of time mothers spend on child care, although employed mothers spend less time with children than non-employed mothers (Kendig and Bianchi, 2008). Single mothers traditionally spend more time working than married mothers, as they are the exclusive provider of the family. As a result, they also must spend less time on child care. Even within single mothers, those who are divorced are more likely to have a full-time job and therefore spend more time on employment than those who were never married, so, based solely on labor force participation, mothers who are never

married can allot more time to child care because they are less likely to have competing employment demands (Kendig and Bianchi, 2008).

Single mothers are especially constrained by their need for income, and the demands on their time are higher for this reason. Kendig and Bianchi (2008) find that single mothers do spend less time with their children than married mothers, when looking at the data's summary statistics. After controlling for various household and mother characteristics (i.e. employment, education, age, age of children), however, this time difference is eliminated. They conclude that if single-mothers were of the same "social structural location" as married mothers, then they would spend a similar, if not greater, amount of time caring for their children. Because single mothers participate more in paid work, they must choose between employment and family responsibilities, weighing the costs and benefits of each to judge which is a better way to spend their time. They are "...faced with a choice between economic independence and providing optimum care for their children" (Craig, 2007, pp. 71), a choice that is dependent on the prices of the goods they use.

Because of the income constraints they face, single mothers' time has a cost: the price of child care and their wage (Kimmel and Connelly, 2006). The cost of time participating in paid work is their wage minus the price of child care, if the alternative to employment is the primary child care of one's own children. For women who are participating in a leisure or home production activity without their child present, the opportunity cost is their wage plus the price of child care, since they are forgoing their wages and "paying" someone else to care for the child at that time, unless the child is at school or old enough to care for herself; in this case, the cost is simply the forgone wage.

As is evident in the costs to mothers' time, the price of child care impacts their decisions and forces them to choose between employment and caring for their children. Some previous literature (Andren, 2003; Kimmel and Connelly, 2006; Tekin, 2007) has focused on how single mothers' labor force decisions are impacted by child care costs. Kimmel and Connelly's (2006) study investigated the relationship between a mothers' wage, the price of child care, and the time they spent on child care and paid employment. They found that both wages and the price of child care have a significant impact on mothers' time use decisions. Higher wages lead to an increased amount of time in both paid employment and on child care, for both weekdays and weekends. They believe that the reason for the increase in child care is due to a strong income effect on the demand for high quality child care; in this case, high quality child care requires more maternal time, not more purchased child care time.

An increase in the price of child care for young children increases the amount of child care time and decreases a mother's time in paid employment on weekdays. A higher price also increases the amount of time spent in employment on weekends, demonstrating that mothers who opt out of employment on the weekdays because of the high cost of child care are able to substitute working on the weekends, likely due to the presence of other people available to care for young children, such as teenage children. For school-age children, however, price has a negative effect on the utilization of paid child care but does not impact mothers' employment during the weekdays; possibly due to the availability of free after-school care or the ability of the children to take care of themselves (Kimmel and Connelly, 2006).

Single mothers' lack of income clearly impact the constraints on their time, as they must weigh each cost carefully before deciding upon the optimum use of their time. For this reason, gas prices may have a significant effect on single mothers' time use. In addition, gas prices could be seen as the "cost" to certain activities, as it is directly used for travelling to and from work, running errands, etc.

This is evident in Meyer and Sullivan's (2006) study, which analyzes how changes in welfare policy affect the consumption (and, in that way, the income choices) of single mothers. For mothers in the lower income quintiles, they altered their consumption choices by increasing spending on transportation. Since the welfare policy increased single mothers spending on transportation, there is clearly a place in their budget for gas, and higher gas prices would limit their funds even further, therefore altering their time use. To recover from higher gas prices, single mothers should prefer paid employment, as that is their only means of maintaining their standard of living.

Since many single mothers are struggling to make ends meet, gas prices are likely to have a significant impact on the amount of time they spend working. Due to the tradeoff between working and childcare, changes in gas prices are expected to alter how much time single mothers spend caring for their children.

II. Econometric Model

The data used for this study was obtained from the *American Time Use Survey* (ATUS) 2003-2009 (Bureau of Labor Statistics, 2009). The ATUS is a subset of the Current Population Survey (CPS). Participants in the CPS are surveyed about their place of residence, personal and household characteristics, and work experience. Four months following their last CPS interview, a subset of those individuals is chosen to complete the ATUS. Respondents are randomly assigned a diary day and are asked to keep track of every activity during that 24 hour period (e.g., time spent at work, caring for children, sleeping, etc.). This data allows for detailed analysis of how the respondents use their time, as every minute of the day is recorded in the time diary (although the level of detail provided by the respondents varies). This is pooled cross-section data, since each individual was sampled only once but the data covers multiple years. The gas price data is from the Tax Foundation (2010).

This study specifically looks at single-mothers, defined as those who reported a marital status of: divorced, separated, never married, or widowed, and did not report living with an unmarried partner. In this way, one can isolate those mothers who are unlikely to have a source of income outside of their own or another adult able to care for their children whenever necessary (as is true of a married or cohabiting couple). These are likely to be the mothers that face the most budget and time constraints, and they are therefore the ones of interest.

All of these mothers reported having at least one own child living in their household. For an accurate analysis of the impact of gas prices on child care, the mother would need at least one child at home who required supervision at almost all times. Because of this, mothers whose youngest child was above the age of 12 were eliminated from the dataset. Children who reach the age of 13 are likely to be capable of taking care of themselves, at least for a few hours before their mother returns from work. Because this analysis focuses on the tradeoff between child care

and work time, unemployed mothers were also omitted. Due to their lack of employment, these mothers do not have to decide between the benefits to working and the cost of child care, and the 0 work time they inevitably report (and the probable higher child care time) would return inaccurate results, as they would appear to be employed mothers who just did not work on their diary day.

In addition, mothers who do not report any child care time for that day were excluded. This is necessary because, on an average day, single mothers living with their children must, at some point, care for that child. Those mothers who reported no child care time were likely to be reporting on an abnormal day that did not require that they cared for their child, whether they were out of town for a business trip, their children were at a friend's house, etc., or, for some reason, they just did not report that they cared for their child during that day. Including these women would also return incorrect results, so they are left out of this model.

Given all of the restrictions on this data, the sample size decreased from 5,617 single mothers to 2,796. This restricted group of single mothers excludes those who reported no child care time, whose youngest child was not under 13, who were unemployed, and who did not report weekly earnings.

To test the hypothesis of this paper, the best model is a two-stage least squares regression (2SLS). Given the nature of the two dependent variables, child care time and work time, they are determined simultaneously. Child care time is a function of work time, but work time is also a function of child care time.

$$(1) \quad CHILDCARE = \beta_0 + \beta_1 Xs + \beta_2 WORKTIME + u$$

$$(2) \quad WORKTIME = \gamma_0 + \gamma_1 Zs + \gamma_2 CHILDCARE + \mu$$

As is evident from these two equations, work time determines child care time, which simultaneously determines work time, and so on. Substituting equation 2 into equation 1 would demonstrate that there exists a correlation between *CHILDCARE* and the error term. This correlation causes a biased β and violates one of the assumptions of the CLRM – thus rendering any OLS estimate meaningless. Running a 2SLS regression instead will handle this endogeneity, because it creates an estimate for work time that is not dependent on child care time. Since this estimate for work time is not a function of child care time, it is not simultaneously determined and will therefore not cause biased estimates.

Essential to this regression are the instrumental variables, which are used to uniquely identify the dependent variables. In this way, work time can have a separate equation explanatory variables that do not affect child care time. These variables, which will be described below, are: gas prices, part-time, weekly earnings, education, unemployment rate, occupation codes, and industry codes. This process also requires instruments for child care time that do not affect work time, which include: number of children and age of the youngest child. These instruments allow for the two endogenous variables to be determined independent of one another, and work time is no longer a function of child care time.

Therefore, the equation for work time is:

$$(3) \quad WORKTIME = \beta_0 + \beta_1 GAS + \beta_2 PARTTIME + \beta_3 WEEKLYEARN + \beta_4 EDUCATION + \beta_5 UNEMPLOYRATE + \beta_6 OCCUPATION + \beta_7 INDUSTRY + u$$

And the new equation for child care time is:

$$(4) \quad CHILDCARE = \beta_0 + \beta_1 RACE + \beta_2 NUMCHILDREN + \beta_3 AGEYOUNGCHILD + \beta_4 MOMAGE + \beta_5 MARITALSTAT + \beta_6 METROPOLITAN + \beta_7 HOLIDAY + \beta_8 MONTH + \beta_9 DAY + \beta_{10} WORKTIME$$

Here, in equation 5, *WORKTIME* is actually the work time generated in equation 3. In this manner, the simultaneity problem is solved, because work time is now determined separate from child care time. Child care time no longer has an impact on work time, thus eliminating the endogeneity problem.

Since the theory behind the hypothesis of this paper assumes that single mothers face income constraints, the regressions will also be run for single mothers whose total income is less than \$15,000 a year. In this manner, one can identify whether gas prices has a significant impact on all single mothers or just those who face severe poverty.

WORKTIME is the variable that captures the total amount of time the mother spends at work on her diary day. This variable is also constructed by the ATUS. This variable is logged for the same reason as child care time; at some point, the mother cannot work any additional hours, so there are decreasing returns to work time.

GAS is the log of gas prices plus the state gas tax and is adjusted for inflation. This is expected to be negatively correlated with time spent on child care, since one can view it as an additional constraint on single-mothers already limited budget. Because of their unique circumstances as the sole provider for their children, rising gas prices should alter how they spend their time, as certain activities require the use of the car, and single mothers may have to choose to work around these activities if there is no place in their budget for the additional cost of gas. This effect will mostly work through the time mothers spend at work; since transportation is required for many other activities that a mother must do (such as shopping for groceries, dropping her kids off, etc.), higher gas prices could increase their work time because they will have to make up for the increased costs by working more.

PARTTIME is a dummy variable for whether the mother works part-time, with the omitted category being full-time. This variable is expected to be positive, since mothers who work part-time are free to spend more time on child care, compared to those mothers who work full-time. This is used as an instrument for work time, since women who are employed part-time likely spend less time at work on their diary day.

WEEKLYEARN captures the amount of money the mother reports to earn weekly (which is the most commonly used ATUS earnings variable). This variable has been logged, since the amount of money mothers earn is unlikely to be linear. Based on the literature, this variable is likely to be positively related to time spent in child care, as mothers with higher incomes devote

more time to child care. This variable does not, however, capture any earnings beyond those from paid employment, and is therefore used as an instrument for work time, since it is just the mother's wage. Mothers who earn more should also work more, because the opportunity cost of not working is higher.

EDUCATION consists of several dummy variables controlling for the mother's education: no high school diploma, a high school diploma, some college, and a college degree, with the omitted variable being not having a high school diploma. The literature suggests that this variable would be positive, as previous research has found that mothers with more education tend to spend more time on child care. These are included as instruments for work time, although whether they are positive or negative is ambiguous. Mothers with a college degree may work more since their wage is likely to be higher, but mothers with a high school diploma may work more because they must to earn enough money to support their family.

UNEMPLOYRATE is the unemployment rate for the state in the month of the interview, and is included to capture the general economic condition of the community at that time and the difficulty of finding work. This variable is an instrument for work time. A high unemployment rate could suggest that mothers are facing greater budget constraints and a cut in the number of hours they work. If this is the case, then they should be substituting that time by caring for their children, as well as saving money because they cannot afford to pay someone to watch their children. Therefore, this would be positive.

OCCUPATION consists of six dummy variables for the mother's main occupation. *INDUSTRY* includes thirteen dummy variables for the industry of her main job. These are used mainly as controls and are included as instruments for the mothers' work time.

CHILDCARE is equal to the total amount of time the mother spent on child care for children under the age of 13. This is the child care time variable constructed by the ATUS. Mothers who reported zero for this variable were excluded. This variable was logged; because it is a time variable, it is non-linear. At some point, a mother cannot spend any more time on child care, no matter how much the explanatory variable increases it, so this variable will have always have some boundary and therefore be non-linear.

RACE includes dummy variables for women who are white, black, Hispanic, and other. In the regression, "white" is the omitted category. These are added to the model to control for differences in child care time related to the race of the mother, such as cultural differences. Literature suggests that they do not have a significant impact on child care time (Kendig and Bianchi, 2008).

NUMCHILDREN is the number of children present in the household. Previous research (Kalenkoski, Ribar, and Stratton, 2005; Kendig and Bianchi, 2008) has found mixed results for the effect of an increase in the number of household children. If these children are young, then this should be positively correlated to child care time, since more young children would require more care. If these children are older, it is expected to be insignificant or negative, since older children require less child care. This variable is used as an instrument for child care time.

AGEYOUNGCHILD is the age of the youngest child in the household, represented as four dummies: one for children under 1, one for children between 2 and 5, one for children between 6 and 9, and one for children 10 through 12. These dummies are used to get a more accurate picture of the impact the age of the mothers' youngest child has on her time use. Instead of just reading it as older children requiring less time, these variables can now be read as a scale, since infants tend to require more time than the other groups, and children above 10 are likely to be in school full-time, and perhaps able to care for themselves for a few hours. As mentioned above, any families that do not have a child that is less than 13 years old was deleted, so this variable always falls in the range defined above. This should be negative for older children, since previous research suggests that older children require less care, and young children need more supervision (Kimmel and Connelly, 2006; Kendig and Bianchi, 2008). For the 2SLS regression, this is one of the instruments for child care time. *MOMAGE* is the reported age of the mother and is included as a control. This variable could be positive or negative, depending on the circumstances. For instance, a mother's age is likely correlated with the number of children she has and the age of those children.

MARITALSTAT includes several dummy variables for the marital status of the mother: divorced, widowed, separated, and never married, with never married as the omitted category. These could impact child care more through the mothers income, since mothers who are divorced or separated may be receiving some sort of child support, whereas widowed mothers may get some kind of insurance or inheritance, and never married mothers receive no additional support from these sources.

METROPOLITAN is a dummy variable for whether or not the mother reports living in a metropolitan area. This is included as a control for the community in which the family lives. It may relate to the amount and price of paid child care available, and to the amount of work available. If there are more (and less expensive) opportunities for paid childcare in metropolitan areas, then this should be negative.

HOLIDAY is a dummy variable for whether the diary day was a holiday or not. This variable is included to control for the unique time use mothers have on holidays, as they are less likely to be working, and their children are less likely to be in school. For that reason, this should be positive, because mothers are free to care for their own children on holidays.

MONTH includes dummy variables for the month of the diary date, with the omitted category being January. Since children's schedules tend to vary because of school, mothers' time use should change based on the month. Childcare time is likely to be higher during the summer months, since children are less likely to be in school. It could also be higher during December, since most children will have an extended break in this month.

DAY consists of several dummy variables for the day of the week on which the mother recorded her diary day, with the omitted category as Sunday. Compared to Sunday, all of the other days are anticipated to be negative (except, perhaps, Saturday). During the week, children are in school, so childcare time may be lower. On the weekend, mothers either need to find paid childcare or take care of their children themselves, and they have the weekend off of work, they will choose to care for their children themselves.

Thus, in the manner outlined above, this model will capture the impact gas prices have on single mothers' choice between paid work and caring for her child.

III. Results

The baseline regression (1), without any constraints on the mothers' incomes, includes all of the single mothers, with a sample size of 2796, while the regression (2) is constrained to mothers with an income under \$15,000 per year and has a sample size of 916. For two-stage least squares, two regressions are run: one to determine *WORKTIME* using the instruments identified above, and one for "childcare" time, using the results from the *WORKTIME* regression. The results for the two regressions are reported side-by-side. First will be reported variables of interest for the *WORKTIME* regression (for the sake of brevity, full results are reported in the appendix).

Table 1: Regression Results – WORKTIME instruments

Variable	1	2
lngaswtax2	0.449 (0.281)	0.874*** (0.507)
ptime	-0.481* (0.157)	-0.567** (0.241)
lnweekly	-0.104 (0.111)	-0.180 (0.198)
hsdiploma	-0.264 (0.215)	-0.424 (0.285)
somecolle	-0.110 (0.219)	-0.402 (0.303)
colldegree	0.161 (0.261)	-0.016 (0.446)
unemploymentrate	0.036 (0.032)	0.064 (0.058)
intercept	2.588 (2.085)	0.657 (3.604)

* denotes significance at a 0.01 level

** denotes significance at a 0.5 level

*** denotes significance at a 0.1 level

One important detail to notice is the low adjusted R^2 value for both regressions, which is only equal to 0.00647 for (1) and 0.00196 for (2). Ideally, this value would at least be 0.1, since the instruments should explain a significant amount of the variation in the dependent variable. The key reason for the low R^2 value here is that much of the variation for work time is explained by the day of the week. These could not be included as instruments for work time, because they also explain child care time and are therefore not unique. Including the days of the week would significantly raise the R^2 value, but it would also be econometrically incorrect. For this reason, the weak instruments that are available must be used.

One might also note that many of the instruments included here are insignificant. One reason for this is the large number of IVs and probably some multicollinearity (especially among

the industry codes), which would lower the t-stats. Excluding some of these instruments increases some of the t-stats, but reduces the R^2 value even more, so they are included to try and explain as much of the variation in work time as possible.

Table 2: Regression Results – CHILDCARE regressions

Variable	1	2
raceother	0.125*** (0.072)	-0.049 (0.141)
black	0.037 (0.036)	0.052 (0.065)
hispanic	0.088** (0.043)	0.172** (0.077)
numhhchild	0.009 (0.017)	0.016 (0.028)
schoolage1	0.034 (0.049)	-0.003 (0.080)
schoolage2	0.067 (0.052)	-0.057 (0.089)
schoolage3	0.103*** (0.058)	-0.104 (0.105)
teage	0.003*** (0.002)	0.011** (0.004)
divorced	-0.081** (0.038)	-0.146** (0.073)
widowed	0.177* (0.098)	0.028 (0.207)
separated	-0.047 (0.046)	-0.031 (0.080)
met	-0.068*** (0.041)	-0.163** (0.069)
holiday	0.512* (0.103)	0.575* (0.174)
ltotworktime	-0.152*** (0.041)	-0.106*** (0.055)
intercept	6.328* (0.154)	6.055* (0.232)

* denotes significance at a 0.01 level

** denotes significance at a 0.05 level

*** denotes significance at a 0.1 level

The adjusted R^2 value for regression (1) is 0.209, and for regression (2) is 0.194.

In regression (1), gas prices are positive but remain insignificant at a .10 level. Therefore, gas prices do not affect the amount of time a mother chooses to work, and thus they do not affect the amount of time she spends on child care. The part-time dummy variable is, as expected, significant and negative; mothers who work part-time spent less time working on their diary day (all else equal, part-time workers spend 48 percent less time working than full-time mothers). The only other significant variables are a couple of the occupation codes, which merely help explain some of the variation in work time.

In regression (2), however, gas prices become significant at a .10 level. If gas prices were to double, mothers would increase their work time by 87 percent, all else equal. This is a large increase in the amount of time spent working, and this increase in work time decreases the amount of time spent on child care (as discussed below). The part-time dummy variable is significant at a 0.05 level, although none of the other instruments are significant.

The estimated work time from the regressions above replaces the original *WORKTIME* variable in the 2SLS *CHILDCARE* regression. Reported below are several variables of interest for the “childcare” regressions (1) and (2), with full results reported in the appendix.

This paper will only discuss some of the more interesting and unexpected results will be discussed. First are the *RACEOTHER* and *HISPANIC* dummy variables, which are both significant and positive (although for regression (2) only *HISPANIC* is significant). *SCHOOLAGE3* is positive for (1), indicating that mothers spend more time on child care when their youngest children are between 10 and 12 (as compared to 0 and 1). For both regressions, divorced mothers spend less time on child care than never married mothers, which is consistent with time use literature. In addition, as was theorized in Section III, mothers who live in a metropolitan area spend less time on child care than mothers who do not, possibly because of increased opportunities for non-maternal child care. As is expected, mothers spend more time on child care during on holidays, on Sundays, and during the summer.

For both regressions, *WORKTIME* is significant (at a 0.01 level) and negative. This result is consistent with the theory, and there is clearly some tradeoff between paid employment and child care. Since gas prices are significant on the *WORKTIME* regression (2), they are thus significant on the child care time of these low-income mothers. If a doubling of gas prices increases working time by 87 percent, and a doubling of working time decreases child care time by 10 percent, then a doubling of gas prices decreases the child care time of low income mothers by 8.7 percent. Since the mean child care time for this data set is 410 minutes per day, a doubling of gas prices would reduce time spent on child care by about 35 minutes. This is an interesting result and is consistent with the hypothesis of this paper.

IV. Discussion

The most significant result is that, for mothers with an income of under \$15,000 per year, gas prices do significantly reduce the amount of time they spend on child care. This supports the theory given above and indicates that higher gas prices could have a detrimental effect on the development of single mothers’ children. For all mothers, work time did, as expected, reduce mother’s child care time. This clearly shows that there is some tradeoff between the two, and mothers must decide if taking care of their own children is worth forgoing their wage. Of interest are the variations in child care time between single mothers of different races. Previous research found no significant difference, but these results indicate that mothers who are not white or black (Hispanic or “other”) report spending a significantly greater amount of time on child care. These results are not completely irrational, as there could be cultural differences that

emphasize family time over working. Another significant finding is that mothers with a youngest child is between 10 and 12 spends more time on child care than those whose youngest child is between 0 and 1. The reasons for this are uncertain, although it may be that these mothers just have more children overall. This finding is contrary to both the literature and common assumptions, so it may not be entirely valid. In addition, *why* a mother is single also significantly affects her child care time. Divorced mothers spend less time caring for their children than never married mothers, maybe because their former husband takes some of the child rearing responsibilities. Widowed mothers, on the other hand, spend more time caring for their children than never married mothers. Further investigation into these discrepancies may reveal interesting family dynamics that affect a child's welfare.

V. Conclusion

The implication from these results is that volatile gas prices exacerbate the time and budget constraints placed upon single mothers, which force them to choose between taking care of their own children and working for pay. Due to this choice, the children of single mothers may not be receiving the optimal care, if gas prices cause mothers to opt to work instead of care for their children. Previous literature has suggested that mothers will choose to reduce their time elsewhere to protect their children from their increased work time. This research has found that mothers who spend more time at work significantly reduce the amount of time they spend taking care of their children. The children of single mothers may be "left behind", as they are more likely to be in a household beneath the poverty line, and their mother faces severe time constraints. Since some literature suggests that family income has more of an effect on children's wellbeing than the employment of their mother, these mothers may be, at the very least, maintaining their children's quality of life by increasing their time working when gas prices rise. But if mothers cannot work enough to cover the increased cost of gas, then children are suffering both from a decrease in family income *and* from a decrease in the amount of child care they receive from their mother. Therefore, understanding how single mothers choose to utilize their time is necessary to determine the implications on the wellbeing of these children. If some policy measure were to increase the income of single mothers (i.e. through welfare or tax breaks) or offset the price of gas (such a subsidizing gas purchases for low-income single mothers), the marginal benefit of choosing paid work over child care would decrease, thus increasing their propensity to choose child care over paid work. The quality of life for their children would be higher, since they would be receiving more care from their mothers, and probably more care overall.

VI. References

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VII. Appendix**A. Table 3: Results from WORK (instruments) regression (1)**

Variable	Estimate	Std. Error
Intercept	2.588	2.085
lngaswtax2	0.449	0.281
Ptime	-0.481	0.157
lnweekly	-0.104	0.111
hsdiploma	-0.264	0.215
somecoll	-0.110	0.219
colldegree	0.161	0.261
unemploymentrate	0.036	0.032
occ2	-0.140	0.185
occ3	-0.355	0.181
occ4	-1.123	1.046
occ5	-0.530	0.656
occ6	-0.701	0.291
ind2	-3.173	3.201
ind3	-0.793	1.245
ind4	-0.343	1.146
ind5	0.074	1.139
ind6	-0.177	1.178
ind7	-0.585	1.181
ind8	-0.315	1.147
ind9	-0.203	1.147
ind10	-0.537	1.135
ind11	0.008	1.149
ind12	-0.771	1.165
ind13	-0.540	1.154
<i>Observations</i>	2796	
<i>Adj R-sq</i>	0.006	
<i>Prob > F</i>	0.013	

B. Table 4: Results from CHILDCARE regression (1)

Variable	Estimate	Std. Error
Intercept	6.328	0.154
raceother	0.125	0.072
black	0.039	0.036
hispanic	0.088	0.043
numhhchild	0.009	0.017
schoolage1	0.034	0.049
schoolage2	0.067	0.052
schoolage3	0.103	0.058
teage	0.004	0.002
divorced	-0.081	0.038
widowed	0.177	0.098
separated	-0.047	0.046
met	-0.068	0.041
holiday	0.512	0.103
month2	0.000	0.070
month3	-0.058	0.067
month4	0.017	0.070
month5	-0.032	0.068
month6	0.075	0.070
month7	0.177	0.070
month8	0.040	0.070
month9	0.035	0.072
month10	0.101	0.070
month11	-0.014	0.070
month12	0.115	0.068
day2	-0.666	0.055
day3	-0.779	0.055
day4	-0.816	0.056
day5	-0.745	0.057
day6	-0.753	0.056
day7	0.027	0.042
ltotworktime	-0.152	0.041
<i>Observations</i>	2796	
<i>Adj R-sq</i>	0.209	
<i>Prob > F</i>	<0.0001	

C. Table 5: Results from WORK (instruments) regression (2)

Variable	Estimate	Std. Error
Intercept	0.659	3.604
lngaswtax2	0.874	0.507
Ptime	-0.567	0.241
lnweekly	-0.180	0.198
hsdiploma	-0.424	0.285
somecoll	-0.402	0.303
colldegree	-0.016	0.446
unemploymentrate	0.064	0.058
occ2	-0.187	0.330
occ3	-0.066	0.300
occ4	-0.314	1.290
occ5	0.884	1.363
occ6	-0.619	0.461
ind2	-2.709	3.493
ind3	0.013	2.078
ind4	0.328	1.784
ind5	0.556	1.779
ind6	0.674	1.867
ind7	-0.543	1.885
ind8	0.338	1.823
ind9	0.403	1.800
ind10	0.102	1.785
ind11	0.656	1.790
ind12	-0.327	1.822
ind13	0.165	1.852
<i>Observations</i>	<i>916</i>	
<i>Adj R-sq</i>	<i>0.002</i>	
<i>Prob > F</i>	<i>0.366</i>	

D. Table 6: Results from CHILDCARE regression (2)

Variable	Estimate	Std. Error
Intercept	6.055	0.232
raceother	-0.049	0.141
black	0.052	0.065
hispanic	0.172	0.077
numhhchild	0.016	0.028
schoolage1	-0.003	0.080
schoolage2	-0.057	0.089
schoolage3	-0.104	0.105
teage	0.011	0.004
divorced	-0.146	0.073
widowed	0.028	0.207
separated	-0.031	0.080
met	-0.163	0.069
holiday	0.575	0.174
month2	0.117	0.125
month3	0.004	0.121
month4	0.049	0.130
month5	-0.039	0.124
month6	-0.019	0.125
month7	0.114	0.130
month8	-0.154	0.121
month9	0.003	0.134
month10	0.154	0.121
month11	-0.044	0.128
month12	-0.007	0.123
day2	-0.578	0.096
day3	-0.606	0.100
day4	-0.619	0.104
day5	-0.623	0.115
day6	-0.723	0.103
day7	0.102	0.075
ltotworktime	-0.106	0.055
<i>Observations</i>	916	
<i>Adj R-sq</i>	0.194	
<i>Prob > F</i>	<0.0001	