Outsourcing Meals: Effects of Maternal Employment on Children's School Meal Participation

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Abstract

Increases in maternal employment have placed significant time constraints on families. This increase is likely to affect mothers' allocation of time towards activities related to children's diet, physical activity, and overall well-being. One potential consequence of such time reallocation is that mothers may choose to "outsource" meal preparation. In particular, school meals might replace brown bag meals for children because they are subsidized, convenient, and nutritionally regulated. In this paper, we examine whether increases in maternal employment influence children's school breakfast and lunch participation. We address the endogeneity of maternal employment using local labor market indicators as instrumental variables. Our results suggest that children whose mothers work are more likely to participate in school lunch perhaps as a means to reduce household time allocated to meal preparation. However, these same children are less likely to participate in school breakfast and more likely to eat breakfast at home with family. These findings suggest that working mothers may view breakfast as an opportunity to spend time with their children. These results are qualitatively similar across full-and part-time work status and various socio-economic groups including single parents.

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1. Introduction

The last four decades have witnessed a dramatic expansion in the labor supply of mothers, especially those with school-age children.[1] This increase is likely to affect mothers' allocation of time towards activities related to children's diet, physical activity, and their overall well-being (Cawley and Liu 2007). One potential consequence of such time reallocation is that mothers may choose to "outsource" meal preparation. In particular, school meals might replace brown bag meals for children. In this paper, we examine whether increases in maternal labor supply lead to increases in children's school breakfast and lunch participation. This issue is important for several reasons. First, "outsourcing" meal preparation to schools is likely to free up a non-trivial amount of time that mothers may spend on activities that enhance their own or their children's well-being (e.g. exercise, reading to children). Second, participation in school meal programs could potentially mitigate adverse changes in children's dietary patterns resulting from increased maternal employment such as skipping meals or eating less nutritious prepared foods. Finally, understanding the determinants of school meal participation can help inform the design of school nutrition programs to better meet the evolving needs of children and their families.

Very little is currently known about how maternal labor supply influences school meal participation. The existing empirical literature on school meal participation either omits maternal employment or treats it as exogenous. This is problematic for two reasons. First, economic theory clearly posits that household decisions regarding the allocation of time across employment, child-rearing and other household activities are made jointly. Second, working mothers (and their households) may differ from non-working mothers (and households) in ways that available observables cannot address (e.g. preferences for healthy lifestyle). Disentangling

[1] Annual Social and Economic supplement, Current Population Survey, Bureau of Labor Statistics.

these mechanisms is critical to understanding the causal impact of maternal employment on school meal participation.

We analyze data from the Early Childhood Longitudinal Study – Kindergarten Class (ECLS-K), which provides school breakfast and lunch participation, maternal labor supply, and detailed socio-economic data for a nationally representative sample of elementary school students during their 1st, 3rd, and 5th grades. Using pooled data from the three grades, we estimate the effects of part-time and full-time work on the likelihood of eating a school breakfast and lunch. Quasi-experimental methods, specifically the use of instrumental variables regressions, are used to isolate the causal effects of maternal employment that operate through the time effect only. Because our models condition on household income, our estimates isolate the effects that operate through the time constraint from the income effects. These effects of are identified using variation across states in labor market conditions, in particular, the unemployment rate. We estimate models for school breakfast and lunch participation separately because the effect of maternal employment may differ for school breakfast versus lunch. Differential effects may follow from parents' taking advantage of the opportunity to spend quality-enhancing time with their children at breakfast (an option that is not available at lunch) or from parents' perceptions of greater stigma associated with school breakfast participation.

Results from simple probit regressions for school breakfast and lunch participation suggest that working significantly increases the likelihood of both school breakfast and lunch participation. But these estimates are potentially undermined by simultaneity and selection. To address these issues, we estimate bivariate probit models of maternal employment and school meal participation using instrumental variables methods. These models show that maternal employment increases the likelihood of school lunch participation, but reduces the likelihood of school breakfast participation. This pattern of results is consistent across several robustness checks including choice of instruments. The result for school lunch is consistent with the

hypothesis that working mothers rely on school lunch programs to manage time constraints. The result for school breakfast is consistent with a number of explanations, including that working mothers view breakfast as an opportunity to spend time with their children (given that they are less likely to be present immediately after school) or that they associate greater stigma to school breakfast participation. An auxiliary regression examining how frequently at least some of the family eats breakfast together confirms that an increase in mother's employment is associated with a greater likelihood of the family eating breakfast together, even among single parents and those with more children. These effects are larger in absolute terms for children whose mothers work full-time versus part-time.

Our paper makes several contributions to the existing literature. This paper is the first to estimate the causal relationship between maternal labor supply and school meal participation. The models address simultaneity and selection by jointly estimating maternal employment and school meal participation using instrumental variables techniques. Our findings also provide interesting insight into household time allocation decisions, especially the tradeoffs between school breakfast and lunch participation. In particular, our findings suggest that working mothers tend to rely more on school lunch programs relative to breakfast programs as a means to alleviate their time constraints. From a policy perspective, these findings can inform improvements to school meal programs by recognizing the growing needs of families with working mothers. The findings also have broader implications for other policies that promote maternal labor supply (e.g. Temporary Assistance to Needy Families, Family and Medical Leave Act) and, consequently, time allocated to activities that promote children's well-being.

The paper is organized as follows. Section 2 provides the motivation for our study. Section 3 describes the conceptual framework while Section 4 outlines our empirical strategy to address endogeneity and selection. Section 5 briefly describes the ECLS-K data. In Section 6, we discuss the results of our empirical analysis, report robustness checks, and examine

heterogeneity by socioeconomic characteristics. Finally, Section 7 concludes with a summary of our findings.

2. Motivation

Time allocation constraints facing U.S. families are evolving with changes in female labor supply. Since the 1970s, there has been a dramatic expansion in the labor supply of mothers with school-age children. The employment-population ratio of mothers with a youngest child between 6 and 17 years of age increased from 51% in 1975 to 74% in 2005. The increased labor supply is likely to affect mothers' allocation of time towards activities related to children's diet, physical activity, and overall well-being. One recent study shows that maternal employment is associated with reductions in time spent grocery shopping and cooking and with a greater likelihood of purchasing prepared foods (Cawley and Liu, 2007), which has implications for children's health. Away-from-home foods have been linked to a higher risk of childhood obesity (Institute of Medicine, 2005) because they have a higher fat density and lower nutrient density than foods prepared at home (Lin et al., 1999).

Recent estimates based on the 2005 American Time Use Survey provide an informative snapshot of time-use patterns. Mothers with school-age children spend a non-trivial amount of time - on average 50 minutes per day - in food preparation. By comparison, these mothers spend about 50 minutes per day caring for household children and 11 minutes per day in physical activity/exercise. There are significant differences in the time-use patterns of working versus non-working mothers. Averaging across full- and part-time, employed mothers spend an average of 4¾ hours working, 43 minutes in food preparation, 44 minutes caring for children, and 11 minutes in physical activity. In contrast, unemployed mothers are able to devote considerably more time to these activities. They spend about 1 hour 10 minutes per day in food preparation, 1 hour 8 minutes caring for children, and 13 minutes in physical activities. These patterns indicate that working mothers spend on average 38% less time (or 3.15 hours per

week) on meal preparation compared to non-working mothers. Some of the observed differences in time allocated to meal preparation may be facilitated by ”outsourcing” meals, perhaps in part through school meal participation.

School meals are available to children through the National School Lunch Program (NSLP) and School Breakfast Program (SBP). The NLSP serves more than 30 million children annually and the SBP serves nearly 10 million. Participation in the NSLP and SBP has been shown to be associated with eligibility, socioeconomic characteristics, food assistance program participation, region, urbanicity, parental involvement, and the cost of school meal (e.g. see Dunifon and Kowaleski-Jones, 2001; Wemmerus et al., 1996; Gleason, 1995). While there are common determinants, participation in school breakfast may be subject to greater stigma due to the common perception that it serves primarily low-income students (McDonnell et al., 2004).

Less is known, however, about how maternal employment influences school meal participation. Two notable exceptions, Akin et al. (1983) and Gleason (1995), included maternal labor supply in their models. Akin et al. (1983) found that increases in mother’s work hours, conditional on household income, were associated with increases in school lunch participation. But the relationship was statistically significant only for older children aged 12 to 18. Gleason (1995) predicted that children of working mothers were slightly *less* likely to eat school lunch and breakfast, conditional on household income, but the differences were not statistically significant. More recently, a descriptive paper by Crepinsek and Burstein (2004) found that children aged 5-8 years were less likely to eat a school breakfast and less likely to eat any breakfast if their mothers were employed full-time, but again these differences were not statistically significant. These children were significantly more likely to eat a school lunch, but also significantly more likely to skip lunch altogether though differences in skipping meals were small. However, these crosstabulations did not control for the availability of school breakfast

and lunch programs at the child's school nor did they control for income or other child and family characteristics.

There are two main limitations of the existing literature on maternal labor supply and school meal participation. First, these studies do not address the simultaneity of school meal participation and maternal employment. Economic models of household behavior indicate that a mother's time allocation decisions – that is, how much time to devote to household activities, child care and market activities – should be modeled simultaneously. These studies may also suffer from selection bias if working and non-working mothers differ on unobservable factors that are correlated with school meal participation. The goal of this paper is to improve our understanding of the causal effects of maternal labor supply on school meal participation by addressing these concerns.

3. Conceptual Framework

Our conceptual framework is based on economic models of household time allocation where households derive utility from "commodities" that are produced using time and market inputs that are substitutable (Becker, 1981). In this section, we describe a simplified model of mother's time allocation that illustrates the tradeoffs they face related to work and their children's school meal participation. Households maximize utility (U), which is derived from consumption of market goods (X) and child quality (Q) subject to a budget constraint.[2] The budget constraint (M) is a function of mother's work and may be allocated to market goods consumed at market prices (P) including purchased meals and their prices. Child quality, in turn, is produced by a combination of time and market inputs including mother's (or household's) time with the child (C), mother's time in household activities (H), and market goods. A mother must distribute her fixed allocation of time (T) between market work (W), time with children (C), and time in other

[2] In this simplified model, we assume that father's contributions in the form of income and time allocations are held constant.

household activities, including preparing brownbag and home meals (H). Because the total time available is fixed, increases in time allocated to market work requires a reduction in time spent on household production or time with children. Mothers may substitute time inputs for market goods in the production of child quality. The reallocation would depend upon the net marginal utility of time spent on these competing uses.

$$Max\ U\ (X, Q)\ subject\ to\ M(W) = PX$$

$$Where:\ \ Q = Q\ (C,H, X)\ \ and\ \ T = C + W + H$$

An increase in mother's market work will have two immediate effects on school meal participation: 1) an increase in household income (income effect) and 2) a decrease in time available for other activities (time effect). The income effect is clearly negative. Higher income leads to greater ability to afford meals outside of the subsidized programs, which are often associated with stigma. In addition, higher income may also make the child less likely to qualify for free or reduced price meals and so increase the price of school meals, further reducing participation. The focus of our paper, however, is the time effect of maternal labor supply on school lunch and breakfast participation, which is a priori ambiguous.

The time effect on school lunch participation may be zero if working mothers reduce time spent on other activities rather than reducing time spent in meal preparation. The choice to reduce meal preparation time versus other activities depends on the marginal utility of those activities. If mothers do choose to reduce meal preparation time, they may do so by increasing reliance on pre-packaged or processed foods, purchasing meals away from home, or relying on school meals. The relative costs and quality of these meal options may vary and consequently, the choice would depend on their net marginal benefits. School lunches are a strong candidate in this regard because they are subsidized, convenient, and are required to meet federal nutrition guidelines. Therefore, we expect that the time effect on school lunch participation is likely to be positive.

The same logic applies to the time effect on school breakfast participation with some potentially significant modifications. For lunch, mothers had only two options: prepare a brown bag or have their child eat a school meal. For breakfast, however, the child may also eat breakfast at home with the family, which has the potential to benefit child quality. This option may represent an important opportunity for working mothers to spend time with their children because they are less likely to be have the opportunity to do so immediately after school (especially among those working full-time).[3] Furthermore, stigma may limit school breakfast participation (relative to school lunch) because it is more commonly perceived as targeting low-income students. Because of the potential benefits of time spent with children at breakfast and the perceived stigma associated with school breakfast participation, working mothers may prefer to "outsource" their children's lunch over breakfast. Consequently, the time effect on school breakfast participation is likely to be smaller than the effect on lunch participation. It may even be negative if mothers' preferences for spending time with their children or concerns about stigma dominate.

4. Empirical Strategy

Empirical estimation of the causal effect of maternal labor supply on school meal participation requires consideration of two important issues. First, the model described above suggests that the decision to participate in school meals should be modeled jointly with the mother's decision to work. And second, the empirically-observed relationship between maternal employment and school meal participation may simply capture the inherent heterogeneity between working and non-working mothers. For example, working mothers may be those who are less attracted to child-rearing and household activities in general or conversely they may be

[3] Another alternative is differential skipping of meals by children of working versus non-working mothers. Skipping meals is less common among elementary school children relative to middle or high school children. Moreover, differences between elementary children's meal skipping by mother's work hours has been found to be small (Crepinsek and Burstein 2004).

"super-moms" who attempt to spend substantial quality time with their children in addition to working. These unobservable characteristics will likely bias the results of Ordinary Least Squares (OLS) regressions.

Although not focused on school meal participation, a number of studies have addressed the endogeneity of maternal labor supply decisions with respect to other child outcomes. There are two main approaches that have been used in this literature. The first approach relies on panel data to estimate mother or child fixed-effect (CFE) models (e.g. James-Burdumy 2005; Gordon, Kaestner & Korenman 2007; Anderson, Butcher & Levine 2003). An important limitation of this approach is the strong assumption that changes over time in maternal labor supply occur for reasons exogenous to the outcome of interest. Yet studies have shown that child health has a strong positive effect on maternal labor supply (Corman, Noonan and Reichman, 2005; Gould 2004), which implies that CFE estimates may be biased. The second approach uses local area conditions, specifically local labor market conditions and child care regulations, as instrumental variables (IV) for maternal labor supply (e.g. Anderson, Butcher and Levine 2003; Baum 2003; Cawley and Liu 2007). Some of these studies use IV estimation on cross-sectional data while others estimate CFE-IV models. While CFE-IV models are in principle more appealing, labor market and child care regulation instruments tend to become weaker predictors of maternal labor supply when child fixed effects are included. For example, Anderson, Butcher & Levine (2003) used longitudinal data on labor market conditions and child care regulations in the state to identify changes in a mother's labor supply over time (CFE-IV model). However, these instruments were weak in the first-stage and the authors had to rely on child- and mother- fixed effect models without IVs to estimate the impact of maternal employment on childhood obesity. Similarly, James-Burdumy (2005) used similar instruments to estimate the effect of maternal labor supply on children's cognitive development but found a weak first-stage. The alternate approach – using IV estimation on cross-sectional data – relies primarily on across-state

variation in the instruments, which leads to concerns about bias due to unobserved state-specific heterogeneity.

Although our regressions employ panel data on students, the identification strategy relies primarily on cross-sectional variation in our instruments to estimate the effect of maternal labor supply on children's school meal participation. Consistent with previous studies, we use the unemployment rate as an IV under the assumption that it is likely exogenous to school meal participation except for its indirect impact through labor supply decisions. To address concerns regarding bias due to unobservable state-specific heterogeneity, we undertake a number of robustness checks.

Specifically, we jointly estimate a recursive bivariate probit for mother's employment status and her child's school lunch (or school breakfast) participation status. The latent variable specification of this model is as follows:

(1) $W_i^* = \alpha_1 X_{1i} + \alpha_2 Z_i + \upsilon_i$

(2) $SL_i^* = \beta_1 TW_i + \beta_2 X_i + \varepsilon_i$

$E(\upsilon_i) = E(\varepsilon_i) = 0$; $Var(\upsilon_i) = Var(\varepsilon_i) = 1$; $(Cov(\upsilon_i, \varepsilon_i) = \rho$

$W = 0$ if $W_i^* \leq 0$

$= 1$ if $W_i^* > 0$

$SL_i = 0$ if $SL_i^* \leq 0$

$= 1$ if $SL_i^* > 0$

where, W* and SL* are the latent variables and W and SL are the observed variables for mother's employment status and the child's lunch participation, respectively. The vector X includes child and family characteristics, such as gender, race-ethnicity, mother's education and age, whether child belongs to a single-parent family, number of siblings, indicators for

urbanicity, region fixed effects, and grade fixed effects to control for the dynamics of participation as children age. In addition, we control for household income and eligibility for free and reduced-price meals; therefore, our estimates capture the effects of maternal employment that operate through the time constraint The vector Z includes variables that influence whether and how much a mother works, but do not otherwise (independently) influence her child's school meal participation. Specifically, the vector includes the state unemployment rate in the main specification, but also state average weekly wages and state child care regulations in sensitivity analyses. The model is estimated using Maximum Likelihood Estimation on pooled data from the 1st, 3rd, and 5th grade waves. Standard errors in all models are clustered at the state level, except in simple probit regressions (without state level instruments) where they are clustered at the child level.

The bivariate probit model is particularly appealing from an estimation standpoint because it allows us to address a number of estimation challenges within the same model. First, it models the dichotomous school meal participation and work decisions non-linearly. Second, this approach explicitly models the correlation between the two decisions and estimates it from the data. Third, this approach addresses the endogeneity of mother's work decision through exclusion restrictions.

We compare the estimates from the above model with those from separate probit regressions for school lunch participation and mother's work status that do not account for the endogeneity of mother's work or the joint decision process. All models control for the full set of covariates. The same set of models is also estimated for school breakfast participation in order to evaluate whether maternal employment affects these outcomes differently.

We test the sensitivity of our results to alternate specifications of the model. We start by simply including additional state covariates to ensure that state-specific heterogeneity does not drive our results. We then test whether our results hold for both full- and part-time work by

estimating a joint probit-ordered probit model.[4] Our final robustness checks examine the sensitivity of our findings to the choice of instrument by iteratively adding variables that capture the state's child care regulations and average weekly wages as additional instruments.

Finally, we look for heterogeneity in these effects. Specifically, we estimate interaction effects of maternal employment with family characteristics such as single-parent status and number of siblings to determine whether our results are driven by particular socio-economic groups.

5. Data

Our models are estimated using data from the Early Childhood Longitudinal Study – Kindergarten Class (ECLS-K). The ECLS-K surveyed a nationally representative sample of children attending kindergarten in 1998-99, followed by repeated data collection on the original sample in first grade (Spring 2000), third grade (Spring 2002), and fifth grade (Spring 2004).[5] Data on children's participation in the school breakfast and lunch programs as well as maternal labor supply in each grade is obtained through the parent questionnaire typically completed by the child's mother.[6] The school meal participation questions in the parent survey are as follows:

> *"Does {CHILD} usually receive a complete lunch offered at school? By complete lunch, I mean a complete meal such as a salad, soup, a sandwich, or a hot meal that is offered each day at a fixed price, not just milk, snacks, ice cream, or a lunch he/she brought from home."*
>
> *"Does {CHILD} usually receive a breakfast provided by the school?"*

[4] In this model, we differentiate part-time ($W_i^* \leq \delta$) vs full-time work ($W_i^* > \delta$).
[5] See Tourangeau et al (2006) for more information on the survey design and instruments.
[6] Measurement error in parent-reported data is less likely to be a concern in our study for several reasons. First, the school meal participation question asks about "usual" participation, which mothers are more likely to report accurately than participation on a specific day. Second, participation rates in the ECLS-K have been shown to be comparable to those from administrative data (Schanzenbach 2009). And third, school meal participation is the dependent variable in our analyses and so measurement error will not affect the consistency of our estimates, though it may make the estimates noisier.

Detailed socioeconomic characteristics of the children and their families are also collected allowing us to include a rich set of control variables in our regressions. Our analysis sample includes 1st, 3rd, and 5th grade data from children who attended public schools that participated in the lunch as well as breakfast program.[7]

We compiled state-level instruments to address the potential endogeneity of maternal employment and work hours. Our instruments include state labor market conditions. In our main specification, we include only the unemployment rate as an instrument. But in robustness checks with multiple instruments, we add the state's maximum child-to-staff ratio for 3 -year-olds in child care centers and annual average weekly wage for private non-agricultural workers as additional instruments.[8] These factors are likely to affect household labor supply decisions, but are unlikely to have any other direct effects on children's school meal participation. The labor force participation and employment of women, and particularly mothers, is likely to be more sensitive to labor market conditions than male labor supply. Likewise, state child care regulations affect the cost and quality of child care and hence household decisions regarding maternal labor supply, but should not have an independent impact on school meal participation. The stringency of child care regulations for young children affects the costs of child care for younger siblings in the household and potentially proxies for after-school child care costs for the school-aged child as well, thereby influencing mothers' decisions regarding whether and how much to work. The state-level unemployment rate and annual average weekly wage for private non-agricultural workers are available from the Bureau of Labor Statistics. State child care regulations are obtained from Blank and Poersch (2000). The labor market and child care regulations variables correspond to the year in which the child entered the particular grade level.

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[7] We excluded kindergarten data from our analyses because they are confounded by half-day kindergarten programs. The data do not distinguish whether the kindergartener was in school while breakfast and lunch were being served.

[8] We also tested county level labor market conditions and other state child care regulations as instruments, but these were weak predictors of maternal labor supply.

Our analysis sample consists of students attending a school that participates in the relevant school program. We include only students that attend public schools because the ECLS-K questions regarding a school's provision of meals do not distinguish whether the school meals served are part of the SBP and NSLP or not. To avoid confounding these subsidized meal programs with private meal programs, we limit our sample to students attending public schools. Focusing on public school students reduces our sample by approximately 20%, but circumvents the heterogeneity introduced by private schools.[9] In the ECLS-K, 85% of public schools participated in the breakfast program and 99% participated in the lunch program. The breakfast participation is somewhat higher than the national average likely due to the focus on elementary schools.

6. Results

6.1. Descriptive Results

Table 1 shows the school meal participation rates in 1st, 3rd and 5th grade. Approximately, 37% and 82% of children in the 1st grade participate in the breakfast and lunch programs, respectively.[10] This participation is greater than that found in earlier studies such as Wemmerus et al. (1996) where the rates reflected meal participation among all school children rather than just elementary school children. Our estimates are consistent with the literature that younger children are more likely to participate. The rates of participation for both breakfast and lunch are fairly constant throughout the elementary school years, though breakfast shows a slight increase each year.[11]

[9] Private schools include religious schools (e.g., Catholic) that may serve both low- and high-income students while secular private schools likely serve primarily high-income students.
[10] The cross-tabulations are weighted to account for the sampling frame.
[11] When the sample is restricted to children that participated in each year of the survey, the sample is reduced significantly (n=5595 for breakfast, n=7241 for lunch), but participation rates remain similar.

Table 2 shows the demographics of all children in the sample overall and then disaggregated by participation in breakfast, lunch, both programs, and neither program during the 1st grade. The results are consistent with the prior literature. Minorities, lower income, older mothers, lower maternal education, single-parent households, and a greater number of siblings are associated with greater participation in breakfast and lunch programs. Suburban children and children in the Northeast are less likely to participate. Children eligible for free meals are more likely to participate, though we caution that eligibility is imputed.[12] With respect to maternal employment, we find that children of working mothers are less likely to participate in school lunch and breakfast programs, though working more hours (conditional on employment) is associated with greater participation. The negative relationship between maternal employment and school lunch is counterintuitive to our conceptual model likely because these simple cross-tabulations do not control for heterogeneity and selection among mothers in their decision to work.

6.2. Regression Results

In this section, we report results from the probit and bivariate probit models estimated on pooled data from the 1st, 3rd, and 5th grades.[13]

Probit Results

We begin by estimating probit regressions where school breakfast and school lunch participation are the dependent variables. The independent variable of interest is mother's employment status (conditional on income and eligibility). As discussed in the conceptual model, the expected sign of this coefficient is a priori ambiguous and may differ for breakfast

[12] The ECLS-K does not directly ask the parent whether the child is eligible for reduced and free meals. Therefore, we impute eligibility based on income and family size. However, due to a change in the survey question regarding income (from actual income in the 1st grade to income categories in the 3rd and 5th grades),our imputation is more precise for the 1st grade.

[13] The panel is unbalanced because of failure to participate in a particular year and attrition.

versus lunch. Table 3 shows the estimated coefficients and robust standard errors clustered at the child level.

The simple probit results indicate that mother's work has a statistically significant positive effect on both school breakfast and lunch participation (Table 3). These results are consistent with the hypothesis that time-constrained working mothers rely on the provision of school meals to reduce their time allocated to household activities, which include meal preparation. Other coefficients in the probit models have the expected sign. Minorities are significantly more likely to participate in school meal programs. Children of older mothers and more well-educated mothers are less likely to participate. Indicator variables for household income categories show a significant negative and monotonic relationship between income and participation. Children living in single-parent households and having larger families – measured in terms of siblings – are more likely to participate. Living in the Midwest and South is associated with greater participation. The price of the meal, which is captured by eligibility status for the free or reduced price meals, is a significant predictor of meal participation, with eligibility for free meals having a greater effect on participation compared to eligibility for reduced price meals.

Bivariate Probit Regressions

The simple probit estimates discussed above do not address either the simultaneity of the work and meal participation decisions that is implicit in the theory of household behavior nor can they address issues of endogeneity and selection described above. To address these issues, we estimate a joint model of meal participation and maternal employment with exclusion restrictions to identify the effects of employment status on school meal participation (see Table 4). The ρ estimated in the bivariate probit model provides information on the correlation between unobservables that influence meal participation and maternal employment. For both school breakfast and lunch participation, ρ is statistically significant and positive suggesting that unobservables that increase the likelihood of maternal employment also increase the likelihood

of school meal participation. The identifying variable, state unemployment rate, is a strong predictor of maternal employment.

In these specifications, maternal employment now has a significant positive effect on lunch participation, but the opposite effect on breakfast participation. The marginal effects suggest that maternal employment decreases the likelihood of breakfast participation by 26 percentage points and increases the likelihood of lunch participation by 22 percentage points. These results suggest that mothers may use school lunch programs to alleviate time constraints, but not school breakfast programs.[14]

As discussed earlier, one potential explanation for the differing effects of maternal employment on school breakfast vs. lunch participation may be the fact that breakfast alone offers the opportunity to spend quality-enhancing time with children. Alternatively, it may be the case that stigma limits the effect of maternal employment on school breakfast participation. The natural question that follows is whether these children are eating a brown-bag breakfast at school, eating breakfast at home with their family, or skipping breakfast entirely. Unfortunately, the ECLS-K survey does not ask about all of these alternate choices explicitly. However, the survey did ask parents how often at least some of the family ate breakfast together. Table 5 reports estimates from a model that estimates the same bivariate probit for whether at least some of the child's family typically eats breakfast together jointly with mother's work.[15] We find that, when mothers work, their families are more likely to eat breakfast together. Unfortunately, the question does not explicitly identify mothers as one of the family members eating breakfast

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[14] In alternate models, we excluded controls for income and free/reduced price meal eligibility (results available upon request). The coefficient on maternal employment in these models would encompass the income effect as well as the time effect as described in our conceptual model. The effect of maternal employment on school lunch and breakfast participation is very similar to our main result, suggesting that time effects are the primary mechanism through which mother's work affects children's school meal participation.

[15] We define typically as three ore more times in a week. But in alternate specifications, we dichotomized the variable based on whether the family ate breakfast together at least 1, 2, 4, 5, and 6 times a week. The results remained qualitatively similar.

with their children, but implicitly does so in single-parent families. Interacting maternal work with single-parent status shows that the effect on breakfast together is the same among single mothers. While not conclusive, the combination of school breakfast and family breakfast findings provides intriguing evidence that working mothers do not rely on school breakfast programs to alleviate time constraints. Instead they appear to take advantage of the opportunity, available at breakfast but not lunch, to influence child quality.

6.3 Robustness Checks

In this section, we examine the robustness of our main findings by considering additional covariates to control for state-specific heterogeneity, alternate specifications of employment, and sensitivity to choice of instrument.

Inclusion of region fixed-effects in our models controls for heterogeneity across regions, but there may be remaining unobserved heterogeneity across states within a particular region. We re-estimate our models with additional state-level covariates to address any remaining heterogeneity that can undermine estimates based on cross-sectional variation. In alternate regressions, we include the state's school lunch participation rate, food stamp participation rate, or AFDC benefit level. These variables control for unobserved differences across states in the take-up rate for free and reduced price meals (e.g., resulting from factors such as the certification process), differences across states in preferences for public assistance, and generosity in public provision of services, respectively. Including these covariates does not alter our findings (see Panel A Table 6). Moreover, it is important to note that the opposite effects of maternal employment on breakfast and lunch participation already provide an implicit robustness check for our results. State-level unobserved heterogeneity is likely to affect breakfast and lunch participation in similar ways. Yet, the models identify opposite effects of maternal employment on school lunch versus school breakfast. Therefore, it is unlikely that our estimates are biased due to state-specific heterogeneity.

Next, we examine whether our results are sensitive to the specification of maternal employment by estimating part-time and full-time work separately using a joint probit-ordered probit model. Coefficients reported in Panel B Table 6 use 20 hours as the cutoff to define part-time employment, although using 30 hours as the cutoff yields similar results (available upon request). The effects are intuitively larger for those children whose mothers work full-time versus those whose mothers work part-time.

Finally, we examine the sensitivity of our findings to our exclusion restrictions (Panel C, Table 6). Our main models, which were estimated with only the unemployment rate as an instrument, provided an F-statistic above 10. We re-estimate the main model by iteratively adding state child care regulations and average weekly wages as exclusion restrictions. This test is similar in spirit to a formal overidentification test. The instruments remain strong predictors of maternal labor supply with joint F-statistics still exceeding 10. And, the resulting estimates do not differ statistically from our main results.

6.4 Heterogeneous Effects by Household Characteristics

Our main findings appear to be robust, but it is nevertheless reasonable to consider that the effects may differ across families based on their socioeconomic characteristics. In particular, the effect on school meal programs may differ if families face differential time constraints, which may be the case for single-parent households or those with greater number of children.

Table 7 reports results from BVP models that interact mother's work with single-parent status and the presence of two or more siblings in the household, respectively. Across all subgroups, we find the similar pattern of results: mother's work increases school lunch participation, but decreases school breakfast participation. Moreover, the decrease in school breakfast participation is accompanied by an increase in the likelihood of the family eating breakfast together at home. The interaction between mother's work and these socio-economic

characteristics was generally not significant. The exception was among single parents where the negative effect on school breakfast was larger (even though there were no differences in the probability of eating breakfast together with the family). This finding is somewhat surprising because, a priori, one would expect single-parent families to be more time constrained and therefore more reliant on school meals. However, this is consistent with children from single-parent families also being left to eat breakfast at home by themselves and even skipping breakfast, though we are unable to test that explicitly with our data.

7. Conclusions

Increases in mothers' market work must come at the expense of time spent in other activities that contribute to the overall well-being of household members. One potential consequence of increasing time constraints is that working mothers may "outsource" certain time-consuming activities. Time constraints have nutritional consequences because female labor force participation and changing family structure have been linked to greater reliance on prepared foods (Cawley and Liu 2007) and consequently obesity (Crepinsek and Burstein 2004; Sturm 2004). Indeed, significant declines in household work (Bianchi 2000) and meal preparation time (Cutler, Glaeser, & Shapiro 2003) have been documented in surveys alongside increases in consumption of meals prepared away from home (Kant and Graubard 2004). School meals represent a convenient, nutritionally-regulated and inexpensive "outsourcing" alternative to brownbag meals that working mothers may use to alleviate their time constraints. Our paper is the first to examine whether maternal labor supply increases the likelihood that children eat meals prepared at school using models that address simultaneity and selection concerns.

We modeled maternal labor supply and the school meal program participation decisions jointly and estimated the effects of part-time and full-time work on school breakfast and lunch participation, conditional on income and eligibility. Our estimates of maternal labor supply effect,

therefore, capture the time effect on school meal participation. School lunch and breakfast participation were estimated separately to allow for different predictions from economic theory about the likely effects of maternal labor supply. Our results show that while mother's work significantly increases school lunch participation, it significantly *reduces* participation in school breakfast. These main results are robust across a number of specification checks. That the effects are larger for full-time versus part-time employment further suggests that the time allocation decisions motivate these behaviors. The increased participation in lunch among the children of working mothers is consistent with these households facing significant time constraints particularly with respect to meal preparation.

The breakfast result, however, raises concerns about where these children are eating breakfast if not at school. One hypothesis is that working mothers may choose to spend quality-enhancing time with their children in the morning and providing breakfast at home gives them this opportunity. Alternately, working mothers may have less time to oversee their children's eating habits, resulting in an increased likelihood of skipping meals. To differentiate these potential explanations, we examined whether maternal employment influences how often at least some of the family eats breakfast together. Mother's work had a positive impact on this outcome, even among single-parent households where the mother is more likely to be among the participants. Together, these results suggest that working mothers rely on school meals for their children's lunch needs, but choose to forgo school breakfast programs possibly because they view breakfast time as an opportunity to spend quality-enhancing time with their children. Our results also show that the effects of mother's work on school meal participation and on the probability that the family eats breakfast together are qualitatively similar across a variety of demographic characteristics.

These findings provide useful insight into the time allocation decisions of households with working mothers. From a policy perspective, these findings can be used to improve the

design of school meal programs by recognizing the needs of working mothers and their children. More broadly, our results also suggest that policies that promote maternal labor supply (e.g. TANF, FMLA) may indirectly affect children's health-related outcomes by influencing decisions regarding participation in school meal programs. Finally, future research could quantify the amount of parental time saving that school meal programs facilitate and how this extra time is redistributed within households.

Table 1: School Meals Participation by Grade in Public Elementary Schools

	Grade 1	Grade 3	Grade 5
Breakfast participation rate	37.38	39.23	41.90
Observations	9642	8159	6701
Lunch participation rate	81.86	82.95	81.97
Observations	11397	9646	7927

Source: Author's calculation based on ECLS-K Restricted Use First, Third, and Fifth Grade Data. All estimates are weighted.

Table 2: Socioeconomic Characteristics by School Meal Participation Status During First Grade

	All	Breakfast Only	Lunch Only	Both	Neither
Race/Ethnicity					
White	52.9	58.3	61.0	34.5	72.3
Black	18.6	13.9	12.6	30.9	7.8
Hispanic	21.5	24.1	19.9	26.81	13.4
Other race/ethnicity	7.0	3.7	6.6	7.8	6.5
Gender					
Female	48.2	50.2	49.1	47.3	47.5
Male	51.8	49.8	50.9	52.7	52.5
Family Composition					
Single parent	27.0	28.6	21.1	40.6	11.7
Both parents	73.1	71.4	79.0	59.4	88.3
Number of siblings	1.6	1.3	1.4	1.9	1.4
Mother's Education					
Less than high school	18.2	13.4	13.3	29.0	7.0
High school or equivalent	33.5	44.5	31.9	38.9	24.5
Some college	32.1	27.2	35.4	26.6	35.2
Bachelor's degree or more	16.0	15.0	19.2	5.3	33.1
Mother's Age	36.8	38.0	36.6	38.1	34.3
Household Income					
Income < $15,000	19.0	27.5	11.4	34.6	3.7
$\leq$ $15,000 Income < $25,000	18.0	14.5	14.6	26.7	7.2
$\leq$ $25,000 Income < $35,000	17.0	23.5	17.3	18.6	11.0
$\leq$ $35,000 Income < $50,000	17.6	12.1	20.9	11.5	22.8
$\leq$ $50,000 Income < $75,000	15.1	12.0	19.2	5.2	26.8
Income $\geq$ $75,000	13.4	10.5	16.6	3.4	28.5
Urbanicity					
Central city	36.5	46.1	35.4	39.6	31.2
Suburb	35.4	27.9	38.1	26.0	50.4
Town	13.9	8.3	13.9	16.2	8.7
Rural	14.3	17.7	12.6	18.2	9.6
Region					
Northeast	15.8	19.2	16.0	10.4	28.4
Midwest	18.7	8.4	22.2	16.2	14.4
South	44.0	48.0	39.1	53.1	36.5
West	21.6	24.4	22.7	20.3	20.7
Maternal Labor Supply					
Mother working full-time	60.2	63.4	61.9	59.3	56.6
Mother working part-time	9.2	4.5	9.7	6.2	14.4
Mother not working	30.6	32.1	28.4	34.5	29.0
Eligibility					
Full	46.2	41.4	57.2	21.2	74.5
Reduced	15.1	19.2	15.0	16.0	13.1
Free	38.6	39.3	27.7	62.8	12.4
Observations	9638	116	4713	1449	3360

Source: ECLS-K Restricted Use Data for first grade.
Notes: The sample shown is comprised of first-grade students who attended a public school offering both breakfast and lunch programs.

Table 3: Estimates from Probit Regressions of School Meal Participation on Mother's Employment Status

	School Breakfast	School Lunch
Mother employed	0.094**	0.183**
	[0.024]	[0.027]
Grade 3	0.101**	0.073**
	[0.020]	[0.023]
Grade 5	0.213**	0.101**
	[0.023]	[0.026]
Female	-0.046*	-0.012
	[0.023]	[0.025]
Black	0.546**	0.318**
	[0.035]	[0.044]
Hispanic	0.266**	0.223**
	[0.034]	[0.039]
Other race/ethnicity	0.168**	0.144**
	[0.039]	[0.042]
Mother's education: High School or Equivalent	-0.186**	-0.084+
	[0.035]	[0.046]
Mother's education: Some College	-0.281**	-0.178**
	[0.036]	[0.046]
Mother's education: Bachelor's Degree or more	-0.466**	-0.352**
	[0.046]	[0.051]
Mother's age	-0.061**	-0.045**
	[0.011]	[0.013]
Mother's age squared	0.001**	0.000**
	[0.000]	[0.000]
$15,000 ≤ Income < $25,000	-0.180**	-0.131*
	[0.034]	[0.053]
$25,000 ≤ Income < $35,000	-0.301**	-0.231**
	[0.045]	[0.065]
$35,000 ≤ Income < $50,000	-0.468**	-0.375**
	[0.058]	[0.080]
$50,000 ≤ Income < $75,000	-0.649**	-0.405**
	[0.067]	[0.086]
Income ≥ $75,000	-0.880**	-0.541**
	[0.072]	[0.088]
Single parent family	0.136**	0.110**
	[0.028]	[0.036]
Number of siblings	0.106**	0.056**
	[0.010]	[0.012]
Reduced Price Meal Eligible	0.156**	0.148**
	[0.040]	[0.047]
Free Meal Eligible	0.349**	0.292**
	[0.054]	[0.069]
Midwest	0.155**	0.412**
	[0.040]	[0.040]
South	0.408**	0.306**

	[0.035]	[0.035]
West	0.090*	0.166**
	[0.040]	[0.040]
Suburb	-0.024	0.022
	[0.027]	[0.029]
Town	0.354**	0.377**
	[0.031]	[0.035]
Observations	23,758	23,758

Notes: Figures in table are regression coefficients with robust standard errors clustered at child level in brackets. Regressions also include a constant and control for an indicator for missing data on mother's education. + significant at 10%; * significant at 5%; ** significant at 1%

Table 4: Estimates From a Bivariate Probit Model of School Meal Participation and Mother's Employment Status

	School Breakfast		School Lunch	
	Meal Participation	Mother's Employment Status	Meal Participation	Mother's Employment Status
Mother employed	-0.792**		0.871**	
	[0.229]		[0.338]	
Grade 3	0.106**	0.017	0.060+	0.006
	[0.026]	[0.022]	[0.036]	[0.025]
Grade 5	0.225**	0.224**	0.077+	0.245**
	[0.030]	[0.032]	[0.041]	[0.032]
Female	-0.049*	-0.029	-0.007	-0.024
	[0.023]	[0.017]	[0.024]	[0.018]
Black	0.580**	0.325**	0.261**	0.322**
	[0.072]	[0.036]	[0.075]	[0.036]
Hispanic	0.257**	0.098**	0.203*	0.097**
	[0.070]	[0.034]	[0.084]	[0.034]
Other race/ethnicity	0.152	0.088	0.125	0.084
	[0.099]	[0.068]	[0.078]	[0.066]
Mother's education: High School or Equivalent	-0.079*	0.254**	-0.145*	0.257**
	[0.037]	[0.039]	[0.068]	[0.038]
Mother's education: Some College	-0.149**	0.335**	-0.255**	0.333**
	[0.055]	[0.038]	[0.077]	[0.037]
Mother's education: Bachelor's Degree or more	-0.296**	0.481**	-0.447**	0.475**
	[0.068]	[0.063]	[0.066]	[0.062]
Mother's age	-0.027+	0.103**	-0.065**	0.104**
	[0.016]	[0.012]	[0.014]	[0.012]
Mother's age squared	0	-0.001**	0.001**	-0.001**
	[0.000]	[0.000]	[0.000]	[0.000]
$15,000 ≤ Income < $25,000	-0.028	0.439**	-0.224**	0.440**
	[0.041]	[0.042]	[0.049]	[0.043]
$25,000 ≤ Income < $35,000	-0.103	0.552**	-0.347**	0.554**
	[0.069]	[0.055]	[0.061]	[0.057]
$35,000 ≤ Income < $50,000	-0.244**	0.586**	-0.499**	0.575**
	[0.084]	[0.060]	[0.081]	[0.062]
$50,000 ≤ Income < $75,000	-0.385**	0.690**	-0.546**	0.676**
	[0.107]	[0.085]	[0.091]	[0.087]
Income ≧ $75,000	-0.633**	0.560**	-0.655**	0.550**
	[0.104]	[0.082]	[0.092]	[0.085]
Single parent family	0.229**	0.392**	0.031	0.398**
	[0.036]	[0.033]	[0.050]	[0.033]
Number of siblings	0.065**	-0.118**	0.080**	-0.120**
	[0.016]	[0.017]	[0.017]	[0.018]
Reduced Price Meal Eligible	0.110*	-0.174**	0.162**	-0.179**
	[0.046]	[0.041]	[0.041]	[0.041]
Free Meal Eligible	0.265**	-0.238**	0.311**	-0.240**
	[0.068]	[0.053]	[0.081]	[0.053]

Midwest	0.148	0.015	0.384**	-0.002
	[0.099]	[0.043]	[0.138]	[0.046]
South	0.364**	-0.068+	0.310**	-0.067+
	[0.099]	[0.040]	[0.063]	[0.040]
West	0.068	-0.015	0.179*	0.004
	[0.079]	[0.057]	[0.088]	[0.053]
Suburb	-0.048	-0.068+	0.035	-0.068+
	[0.052]	[0.036]	[0.049]	[0.036]
Town	0.333**	0.063	0.352**	0.058
	[0.083]	[0.052]	[0.059]	[0.052]
State Unemployment Rate		-0.083**		-0.105**
		[0.026]		[0.029]
ρ	0.576**		-0.422+	
	[0.180]		[0.221]	
Observations	23,499	23,499	23,499	23,499

Notes: Figures in table are regression coefficients with robust standard errors clustered at state level in brackets. Regressions also include a constant and control for an indicator for missing data on mother's education. + Significant at 10%; * significant at 5%; ** significant at 1%

Table 5: Estimates from a Bivariate Probit Model of Eating Breakfast with Family and Mother's Employment Status

	Family eats breakfast together >= 3 times/week	Mother's Employment Status
Mother employed	0.538*	
	[0.257]	
Grade 3	-0.167**	0.025
	[0.023]	[0.021]
Grade 5	-0.429**	0.223**
	[0.020]	[0.030]
Female	-0.002	-0.026
	[0.019]	[0.018]
Black	-0.384**	0.331**
	[0.058]	[0.036]
Hispanic	-0.222**	0.097**
	[0.055]	[0.033]
Other race/ethnicity	-0.06	0.088
	[0.054]	[0.067]
Mother's education: High School or Equivalent	0.018	0.257**
	[0.057]	[0.039]
Mother's education: Some College	0.122+	0.335**
	[0.066]	[0.037]
Mother's education: Bachelor's Degree or more	0.332**	0.477**
	[0.080]	[0.063]
Mother's age	-0.01	0.104**
	[0.012]	[0.012]
Mother's age squared	0	-0.001**
	[0.000]	[0.000]
$15,000 ≤ Income < $25,000	-0.097	0.438**
	[0.060]	[0.044]
$25,000 ≤ Income < $35,000	-0.091	0.549**
	[0.072]	[0.057]
$35,000 ≤ Income < $50,000	-0.029	0.585**
	[0.083]	[0.062]
$50,000 ≤ Income < $75,000	0.093	0.681**
	[0.100]	[0.085]
Income ≥ $75,000	0.204*	0.551**
	[0.093]	[0.083]
Single parent family	-0.022	0.396**
	[0.038]	[0.033]
Number of siblings	0.104**	-0.120**
	[0.017]	[0.018]
Reduced Price Meal Eligible	0.07	-0.181**
	[0.050]	[0.043]
Free Meal Eligible	0.019	-0.241**
	[0.065]	[0.054]

Midwest	-0.018	0.035
	[0.041]	[0.042]
South	-0.051	-0.072+
	[0.041]	[0.039]
West	0.072+	-0.012
	[0.041]	[0.057]
Suburb	-0.021	-0.065+
	[0.034]	[0.038]
Town	-0.032	0.052
	[0.050]	[0.051]
State Unemployment Rate		-0.082**
		[0.024]
ρ	-0.485**	
	[0.172]	
Observations	23,455	

Notes: Figures in table are regression coefficients with robust standard errors clustered at state level in brackets. Regressions also include a constant and control for an indicator for missing data on mother's education. + Significant at 10%; * significant at 5%; ** significant at 1%

Table 6: Estimates of Maternal Employment Coefficients from Alternate Models

	Breakfast Participation	Lunch Participation
(A) Additional state level controls		
School lunch participation rate	-0.863**	0.653
	[0.190]	[0.434]
AFDC benefit level	-0.770**	0.697*
	[0.202]	[0.322]
Food stamp participation rate	-0.836**	0.925*
	[0.221]	[0.430]
(B) Using categorical measure of maternal employment		
Part-time (0 < hrs/wk <= 20)	-0.543**	0.321**
	[0.052]	[0.114]
Full-time (hrs/wk > 20)	-1.015**	0.986**
	[0.147]	[0.312]
(C) Multiple exclusion restrictions		
State unemployment rate; Max. child-to-staff ratio	-0.777**	1.019**
	[0.234]	[0.286]
State unemployment rate, Max. child-to-staff ratio, Annual average weekly wage of private non-agricultural worker	-0.833**	1.207**
	[0.234]	[0.260]

Notes: Figures in table are regression coefficients with robust standard errors clustered at state level in parentheses. All models include the full set of covariates included in the main regressions in Table 4. $^{+}$ significant at 10%; * significant at 5%; ** significant at 1%.

Table 7: Effects of Maternal Employment on School Meal Participation and Eating Breakfast with the Family, by Selected Family Characteristics

	School Breakfast	School Lunch	Breakfast together with family >=3 times/week
(A) Effects by family type			
Effect of maternal employment for children in two-parent families	-0.698**	0.947**	0.568*
	[0.224]	[0.297]	[0.244]
Additional effect for children in single-parent families	-0.185**	-0.086	0.071
	[0.044]	[0.076]	[0.054]
(B) Effects by sibship size			
Effect of maternal employment for children with one or no siblings	-0.887**	0.998**	0.663**
	[0.225]	[0.342]	[0.243]
Additional effect for children with two or more siblings	0.07	0.008	-0.057
	[0.047]	[0.056]	[0.038]
Observations	23,499	23,499	23,455

Notes: Estimates are from BVP models that include interactions between maternal work and family characteristics and use state unemployment rate and max. child-to-staff ratio as exclusions. Figures in parentheses are robust standard errors clustered at the state level. + Significant at 10%; * significant at 5%; ** significant at 1%. [&] significantly different from the comparison subgroup at the 5% level.

References

Akin, J.S., Guilkey, D.K., Popkin, B.M., Wyckoff, J.H., 1983. The demand for school lunches: An analysis of individual participation in the school lunch program. Journal of Human Resources 18(2), 213-230.

Anderson, P., Butcher, K., Levine, P.B., 2003. Maternal employment and overweight children. Journal of Health Economics 22, 477-504.

Baum, C., 2003. Does early maternal employment harm child development? An analysis of the potential benefits of leave taking. Journal of Labor Economics 21(2), 409-448.

Bhattacharya, J., Currie, J., Haider, J., 2004. Breakfast of champions? The school breakfast program and the nutrition of children and families. NBER Working Paper 10608.

Bianchi SM 2000. "Maternal Employment and Time with Children: Dramatic Change or Surprising Continuity?" Demography 37 (4): 401-414.

Blank, H., Poersch, N.O., 2000. State developments in childcare and early education, 1999. Children's Defense Fund.

Cawley, J., Liu. F., 2007. Maternal employment and childhood obesity: A search for mechanisms in time use data. NBER Working Paper 13600. National Bureau of Economic Research, Cambridge, MA.

Chamberlain, G. 1984. Panel data. In *Handbook of Econometrics*, Vollume 2, ed. Z. Griliches and M.D. Intrilligator. Amsterdam: North Holland, 1247-1318.

Chia, Yee Fei., 2006. Maternal labour supply and childhood overweight and obesity in Canada: Evidence from the NLSCY. Working Paper, University of Toronto.

Classen, Timothy and Charles Hokayem., 2005. Childhood influences on youth obesity. Economics and Human Biology, 3:165-87.

Corman, H. Noonan, K., Reichman, N., 2005. Mother's labor supply in fragile families. The role of child health. Eastern Economic Journal, 31(4), 601-616.

Courtemanche, Charles., 2007 Working yourself to death? The relationship between work hours and obesity. Working Paper, Washington University of St. Louis.

Crepinsek, M.K., Burstein, N.R., 2004. Maternal employment and children's nutrition, volume II, other nutrition-related outcomes. Economic Research Service Report, Abt Associates, Inc.

Dunifon, R., Kowaleski-Jones, L., 2001. Associations between participation in the national school lunch program, food insecurity, and child well-being. Joint Center for Poverty Research Working Paper. Chicago, IL.

Dunifon, R., Kowaleski-Jones, L., 2003. Exploring the effects of the national school lunch program on children using the early childhood longitudinal study. Working Paper.

Fertig, Angela, Gerhard Glomm and Rusty Tchernis., 2006. The connection between maternal employment and childhood obesity: Inspecting the mechanisms. Center for Applied Economics and Policy Research Working Paper #2006-020.

Garcia, Emma, Jose M. Labeaga, and Carolina Ortega., 2006. Maternal employment and childhood obesity in Spain. Working Paper, FEDEA, Madrid, Spain.

Gleason, P.M., 1995. Participation in the national school lunch program and the school breakfast program. American Journal of Clinical Nutrition 61 Suppl 1, 213S-220S.

Gleason, P.M., Suitor, C., 2003. Dietary effect of school lunches. American Journal of Agricultural Economics 85(4), 1047-1061.

Gordon, R., Kaestner, R., Korenman, S., 2007. The effects of maternal employment on child injuries and infectious disease. Demography 44(2), 307-333.

Hinrichs, P., 2006. The effects of the national school lunch program on education and health. Job Market Paper, Massachusetts Institute of Technology

Hofferth, S., Curtin, S., 2004. Do food programs make children overweight? Working Paper, University of Maryland.

Institute of Medicine., 2005. Preventing Childhood Obesity: Health in the Balance. National Academies Press: Washington DC.

James-Burdumy, S., 2005. The effect of maternal labor force participation on child development. Journal of Labor Economics 23(1), 177-211.

Kant AK, Graubard BI. Eating out in America, 1987-2000: trends and nutritional correlates. Prev Med. 2004 Feb;38(2):243-9.

Kleinman, R.E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano M.E., Murphy, J.M., 2002. Diet, breakfast, and academic performance in children. Annals of Nutrition & Metabolism 46 Suppl 1, 24-30.

Lin, Biing-Hwan, Joanne Guthrie, and Elizabeth Frazao., 1999. Away-from-home foods increasingly important to quality of American diet. Washington DC: U.S. Department of Agriculture, Economic Research Service. AIB-749.

Liu, Echu, Cheng Hsiao, and Shin-Yi Chou., 2005. Maternal full-time employment and childhood obesity: Parametric and semiparametric estimation. Working Paper, University of Southern California.

Long, S.K., 1991. Do the school nutrition programs supplement household food expenditures? Journal of Human Resources 26(4), 654-678.

Mauer, K., 1984. The national evaluation of school nutrition programs: Factors affecting student participation. The American Journal of Clinical Nutrition 40(2) Suppl, 425-447.

McDonnell, E., Probart, C, Weirich, J.E., Hartman, T., & Birkenshaw, P. (2004). School breakfast programs: Perceptions and barriers. Journal of Child Nutrition and Management, Volume 28, Issue 2. [Available online: http://docs.schoolnutrition.org/newsroom/jcnm/04fall/mcdonnell/index.asp.]

Nutrition Consortium of New York State, 2004. Academics & breakfast connection pilot: Interim report on New York's classroom breakfast project. New York: Nutrition Consortium of New York State.

Phipps SA, Lethbridge L, Burton P., 2006. Long-run consequences of parental paid work hours for child overweight status in Canada. Social Science & Medicine, 62(4): 977-986.

Rampersaud, G.C., Pereira, M.A., Girard, B.L., Adams, J., Metzl, J.D., 2005. Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. Journal of the American Dietetic Association 105(5), 743-760.

Ruhm, Christopher J., 2004. Maternal employment and adolescent development. National Bureau of Economic Research Working Paper #10691.

Scholder, Stephanie von Hinke Kessler., 2007. Maternal employment and overweight children: Does timing matter? Paper presented at the International Health Economics Association World Congress.

Schanzenbach DW, "Do School Lunches Contribute to Childhood Obesity?," Journal of Human Resources, vol. 44, no. 3, Summer 2009, pp.684-709.

Sturm, R., 2004. The economics of physical activity: Societal trends and rationales for interventions. American Journal of Preventive Medicine, 27(3 Suppl).

Tourangeau, K., Nord, C., Lê T., Pollack, J.M., and Atkins-Burnett, S., 2006. Early childhood longitudinal study, kindergarten class of 1998–99 (ECLS-K), Combined User's Manual for the ECLS-K Fifth-Grade Data Files and Electronic Codebooks (NCES 2006–032). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Weinreb, L., Wehler, C., Perloff, J., Scott, R., Hosmer, D., Sagor, L., Gundersen, C., 2002. Hunger: Its impact on children's health and mental health. Pediatrics 110(4), e41.

Wemmerus, N.E., Forkosh, E.S., Almond, D., 1996. Characteristics of national school lunch and school breakfast program participants. Washington, DC: U.S. Department of Agriculture, Food and Consumer Service, Office of Analysis and Evaluation.

Whitmore, D., 2004. Do school lunches contribute to childhood obesity? Working Paper, University of Chicago.