

Food Security and Teenage Labor Supply[†]

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I. Introduction

Households and their children experience and respond to scarce food resources in a variety of ways. Detailed child interview work by Fram et al. (2011) indicates that children's experiences of food security range from mere cognitive knowledge of the family situation, to deep emotional anxiety, to physical hunger. Children take a variety of actions to help take responsibility for the family food situation, with young children more likely to engage in basic cooperation with parent strategies and older children more likely to consider how they might generate resources for the family. While teenagers were not the focus of the interview work, the findings suggest that these older children have cognitive awareness of food insecurity and are aware of some options they have for resource generation.¹ Combined with their ability to

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¹ Fram et al. (2011) provide an example from their interviews: "In one particularly poignant example, a high-school boy hesitantly described how he and other youth in his community helped their families when food was running out: . . . we'll like get together and we'll find a way to get money up, not, we ain't got to sell no drugs though, not like that, but we'll find a way to get money up. We might all get together and cut the grass or something. We'll find

enter the labor force at age 15, this suggests the possibility that older teenagers in potentially food-insecure households may use early labor force participation to help contribute to family food resources.

In this paper, we explore the relationship between children's food-security dynamics and the labor market decisions of teenagers. In particular, we are interested in understanding whether changes in food security are ever a result of a teenager's entry into (or exit from) the labor force. The empirical approach used here will allow us to estimate the effect of teenage labor force participation on the food security status of the children in the family. We implement our analysis using the Current Population Survey (CPS) annual Food Security Supplement and linked CPS monthly core data from 2001 through 2011.

Unlike many food-security studies using the CPS data, we leverage the short-panel structure of the survey, matching individuals in adjacent survey years to provide additional insight into teenage employment and family food security. First, we are able to assess the year-to-year dynamics of food security status in families with teenagers. A preliminary examination of the data shows a great deal of movement from one year to the next, with only rare occurrences of consistent very low food security. These dynamics motivate our larger research question: Is there evidence that teenage labor force entry and exit has consequences for the food security of the children in their family? To answer this question, we call upon the other advantage of the matched data: we can estimate the effect of employment on food security while controlling for all time-invariant individual and household characteristics using a fixed-

some way . . . people will be putting money up on fights and stuff, too. And they might do dog fights every now and to get money like that.'" (p. 4)

effects model. This approach circumvents the problem of omitted variables that would otherwise bring about potential endogeneity concerns. We then supplement this analysis with an alternative model allowing for a lagged effect of employment on food security, in an effort to properly identify the direction of causality.

Our findings are consistent with the hypothesis that teenage employment has a protective effect on children's food security. While estimates vary across models, we find that teenage employment is associated with an 11 to 22 percent reduction in the baseline probability of food insecurity measured broadly (i.e. combining both low and very low food security). We find less consistency in models that restrict attention to predicting only very low food security, which may be related to estimation challenges for a very low frequency event (less than 1 percent of our sample experiences very low food security).

Identifying the positive role that teenage employment can play in family well-being through buffering against food insecurity provides an important basis for evaluating competing forms of policy investment in this area. While teenage employment may have some positive effects, there is ongoing concern about students being unable to invest significantly in education if they engage in substantial market work. In addition, downturns in the business cycle tend to generate disproportionately high teen unemployment rates at times when families may be in most need of teenagers' contributions. There is continuing debate over the ideal combination of services to improve food security, from direct safety net programs to work and educational assistance. Our findings indicate that the role of very young workers should not be overlooked in this policy discussion.

II. Teenagers in the Household and Labor Force

Teenagers who are old enough to do market work (age 15 in the United States) are often in a stage of transition in which they can begin to learn about handling finances without yet taking significant financial responsibility for their own needs. However, in low income families, teenagers may not have the luxury of relying on family resources to meet all of their needs or those of their younger siblings. There are many reasons to think that teenagers may bear a disproportionate share of the burden of food insecurity in particular, and thus may be more cognizant of the potential need for their contribution to family resources. Unfortunately, data on food security of individual children are not available in the standard source of nationally-representative data on food security; the CPS FSS only captures a measure of children's food security at the household level. However, three important factors point toward teenagers as particularly vulnerable. First, household food security is inevitably worse than child food security, meaning that parents try to buffer children from some of the food-related concerns of the adults in the household. To the extent that the older children in the household play more adult roles, they may also be trying to make their own adjustments to protect younger siblings. Second, there is consistent evidence that older teenagers have low participation rates in the National School Lunch Program, likely due to stigma (Ralston, et al., 2008); this, too, would indicate that they may be among the less-food-secure among children in a household. Finally, assistance programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and Head Start (which includes meals) are specifically targeted at infants and preschoolers, with no direct benefits to teenagers in the house.

It is important to note that while teenagers may be particularly vulnerable to food insecurity conditions, they are also better suited to helping their families manage food security through their ability to generate resources. There is substantial literature examining the resource contributions of children to their households. Debates over child labor standards in developing countries inevitably bring up the fact that some families depend upon children's income to help support the family, potentially contributing positively to family food security. Work on teenagers in the U.S. by Johnson and Lino (2000) indicates that in low-income families, the earnings of teenagers can account for a meaningful share of family income (in their 1997-1998 data, the average was about 9 percent), though they are not able to precisely estimate the magnitude of the possible link between employment and food expenditures. Aaronson et al. (2006) document long-run declines in teen labor market participation and find little reason to expect that the reduction is due to diminished demand for their services, thus leaving open the possibility that teens could realistically enter the labor force if needed for their family's well-being. Meanwhile, the debate over whether market work is beneficial or distracting for teenagers in the long run rages on.

While this is the first work (of which we are aware) that considers the role of teenage employment in alleviating food insecurity, this project finds some motivation in very new work being done on household employment issues and food security. Recent research by Mills et al. (2011) uses panel data to track the relationship between unemployment patterns, food stamp participation, and food security. Work in progress by Mills and Davis goes deeper into

understanding the role of employment shocks in food security dynamics.² Our work in this study contributes to this literature as well.

III. Data and Methods

We utilize a carefully-constructed matched data set that allows us to follow both the food-security and employment experiences of a sample of working-age teenagers over time. This sample is assembled from adjacent December CPS data from 2001 through 2011.³ In these years, the December CPS includes a Food Security Supplement (FSS) containing a comprehensive battery of questions to establish both adult and child food security status. Importantly, the standard monthly CPS also contains detailed information about labor force status of all individuals in the surveyed household who are at least 15 years of age. Each CPS household is interviewed for the same four calendar months in two adjacent years; in any given month's survey, about half of the CPS households are in their first wave of participation and the other half in their second and final wave. We use household and person identifiers, as well as race, gender, and age, to link teenagers 15 to 19 years old across adjacent surveys.⁴ Our final matched sample contains 31,624 observations for 15,812 working-age teenagers. Table 1 describes the distribution of child food security in their families (over the last 12 months). Coleman-Jensen et al. (2011) note that very low food security among children occurred in about 1 percent of households with children in 2010. We find a similar frequency

² See funded proposal summary at: http://www.ukcpr.org/Mills_Davis_Summary.pdf.

³ In years prior to 2001, the Food Security Supplement was asked in varying months of the year, making our panel approach infeasible prior to 2001. For the year 2007, there is a sample loss of about 25 percent due to unsuccessful experimentation with alternative language on some questions (Nord, Andrews, and Carson, 2008).

⁴ Details of our matching procedure are available upon request.

(0.97 percent) in our restricted sample of families with working-age teenagers during 2001-2011. Table 2 contains other relevant descriptive statistics for our matched sample. One can observe that teen employment is an important phenomenon; nearly one-fourth of the teens in our sample are employed.

We examine two features of the sample to establish the basic landscape of food security and employment patterns in these families with teenagers. First we provide a simple qualitative examination of the dynamics of child food security status across two years in our sample of teenagers, which is possible because of the unique structure of the matched data. If food security status varies between “food secure,” “low food security,” and “very low food security” across two years, this motivates us to understand whether there are causal mechanisms for improvements in food security for these families from one year to the next, including the entry of teenage family members into the labor force. Table 3 displays the children’s food security transition matrix for the families of the teenagers in our sample. This table provides evidence that there is a substantial amount of movement between children’s food security states, and in particular, movement in and out of very low food security (VLFS). Among teenagers who begin in a family with VLFS among children, the most common situation the following year is for them to move to the less-severe low food security (LFS) category. Even more strikingly, they are more likely to become fully food secure than to remain with VLFS. Thus, it appears that VLFS is often a temporary situation.

To provide some initial evidence on the magnitude of the possible relationship between food insecurity and teen employment, Table 4 provides the distribution across food security categories separately for employed and non-employed teenagers. Dividing the sample into

employed and non-employed teenagers reveals a striking difference in the children’s food security distribution. The incidence of VLFS among children is less than half as high when teens are employed, and the incidence of LFS (rather than VLFS) is also much lower for children in families with an employed teen. Among teens who are not employed, we see 9.77 percent of their families have LFS or VLFS among children; among the employed this total is only 6.64 percent.

While estimating the correlation between food insecurity and teen employment is fairly straightforward, the use of the panel features of our data from the CPS is essential to a convincing *causal* analysis of teen employment on food security status. There are clear threats to the exogeneity of teen employment in a model of food security, including omitted variables likely to be correlated with both variables (for example, parental characteristics or children’s health status) and reverse causality. We utilize the panel structure of our data to estimate the effects of teen employment on food security status with a fixed-effects model that effectively controls for time-invariant characteristics of the family. This basic model takes the form:

$$ChildFoodSecurity_{it} = X'_{it}\beta + \gamma EmployedTeen_{it} + \sum \alpha_i + \sum \delta_t + \varepsilon_{it} \quad (1)$$

where i marks individuals and t indicates the time period (first or second observation). We measure food insecurity in a dichotomous fashion using two alternative cutoffs: a broader measure (LFS or VLFS) and a narrower one (VLFS only). The vector X_{it} includes time-varying characteristics of the teenager and his or her family and environment (such as family size, education, and marital status). The set of individual indicator variables α_i allows us to identify the effect of teenage employment on children’s food security in their family without conflating it with other person-specific time-invariant factors like family socioeconomic status, parents’

education, and so on; in other words, we are able to net out individual heterogeneity and isolate the relationship between the two variables of interest. We also include year indicators δ_t to account for secular trends in food security nationwide.

The clearest usable measure for the dependent variable in these data reflects children's food security over the past 12 months (i.e. calendar year, since this is a December survey).⁵ Ideally, we would use the teen's employment over the same period; unfortunately, only the March CPS provides a detailed annual retrospective (and our sample would be too small if we restricted to those with both a December and a March survey). We instead use an indicator for whether the teenager has worked in the last week as of the time of the interview.⁶

An alternative means of handling the timing issues in the data is to estimate a specification that uses the teen's employment in the previous December as a predictor of the children's food security status in their family in the following year, i.e.

$$ChildFoodSecurity_{it} = X'_{it}\beta + \gamma EmployedTeen_{i,t-1} + \sum \delta_t + \varepsilon_{it} \quad (2)$$

The main advantage here is additional power to argue causality, as the teenager's employment occurs completely prior to the measurement of children's food security. The sacrifice, however, is that we no longer have two observations for each teen in the sample, as both observations are used to compose a single observation. Consequently, we cannot use individual fixed effects α_i in this case. In sum, both models (1) and (2) tackle the endogeneity issue in different ways: the fixed effects model (1) accounts for individual heterogeneity, while the lagged model (2) takes advantage of timing as a way of solidifying the direction of causality.

⁵ There are some issues with consistency in the questions/reporting of individual items over the many years we are using. However, as noted earlier, we are able to compose aggregate measures that are comparable across years.

⁶ The CPS variable used for this coding is PUWK.

IV. Results

As a baseline for assessing the effect that teen employment may have on the food security of children in a family, we estimate a basic ordinary least squares regression model with an indicator for food insecurity as the dependent variable. We use two different versions of this indicator: one indicates only very low food security, while the other indicates any sub-standard level of food security (low or very low). Results from this regression are provided in the first and third columns of Table 5. We see here that there is a statistically significant, large negative relationship between employment of the teenager and the probability that his or her family faces food insecurity. Of course, this finding could reflect a spurious correlation if there are unobserved family-specific factors related to both employment and food security.

We provide estimates that control for individual-level fixed effects in the second and fourth columns of Table 5, to assess whether a relationship between teenage employment and food security remains even when we control for omitted (time-invariant) unobservable effects. We continue to find a statistically significant negative coefficient on teenage employment. In the case of the broader measure of food insecurity (including both LFS and VLFS), the estimated effect is dampened by the fixed effects but remains substantial, suggesting that families with an employed teen have about a 1-percentage-point lower probability of being food insecure, which is 11% of baseline. The results are larger in percentage terms for our stricter measure (VLFS only), indicating a 55% reduction in the probability of very low food security in the presence of a working rather than a non-working teen. This suggests a protective effect of teen employment when it comes to family food security.

It is possible, however, that these estimates do not isolate the direction of the causal effect – for instance, we might expect a similar result if instead employment was a *response* to food insecurity rather than a *cause* of food security. In an effort to isolate the causal effect of teenage employment on food insecurity, we estimate the lagged models presented in Table 6. While these models cannot also include individual fixed effects (as the required lag uses up the second period of data), they provide additional evidence that teens’ employment improves child food security in their families. The first column suggests a substantial reduction in low or very low food security of about 2 percentage points, or 22% of baseline, for families in which a teenager was working last year relative to those in which a teenager was not working. It appears that most of this effect is related to movement in and out of low food security, as the result in the second column that limits the definition to very low food security does not predict any meaningful effects of employment.

V. Conclusion

Teenagers can play an important role in providing for family needs, and the need for food in hard times may be particularly transparent to the older children in a family. We find evidence that working teenagers reduce the probability that their family will experience food insecurity. Our fixed-effects analysis suggests that a working teenager reduces his or her family’s probability of experiencing at least moderate child food insecurity by about 11%, and reduces the probability of the children experiencing very low food security by over half. An attempt to isolate the causal effect in one direction through a lagged model also suggests a protective effect of teen employment on family food security, but does so only for the broader

definition (low or very low food security). Our overall conclusion is that the evidence supports a real value to teenage employment in families at risk for food insecurity.

Our finding of reduced food insecurity among families whose teenagers work points the policy discussion in a new direction, away from food-related public assistance programs and toward questions of whether public programs can (or should) seek to encourage or discourage teen employment when it is contributing to family well-being. If there is concern that teens are leaving school – or giving school substantially less attention – when they take jobs, intervention (by government or non-profits) may be important for helping families to consumption-smooth over time while teens concentrate on their educational investments. Experience in developing countries indicates that educational incentives can help reduce the probability that a child in a poor family abandons school for work (Behrman, 2005).

On the other hand, there is evidence that limited work among low-income teens may actually complement school engagement (Lerman, 2000) and can provide valuable labor market experience (Carr, Wright, and Brody, 1996) and improvements in self-confidence (Cunnie, MartinRogers, and Mortimer, 2009). To the extent that this employment also contributes to family well-being and food security, this can be a win-win situation. In this case, the greater policy concern is making sure jobs are available. In the recent recession, unemployment rates among teen workers (16-19) have exceeded 25 percent (Edwards and Hertel-Fernandez, 2010); precisely in a family's time of need, a teen may be unable to find the job that could help buffer the family's children against food insecurity. Higher rates of unemployment among black and Hispanic teenagers make this concern even more serious, given the increased likelihood of these groups being in food-insecure families (Coleman-Jensen et al., 2011). Policies to

encourage hiring of teens may merit attention if employment opportunities for teens have desirable impacts on both their own welfare and their families' food security.

VI. References

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VII. Tables and Figures

Table 1: Distribution of Children’s Food Security Among Families with Working-Age Teens

Children’s Food Security Status	Frequency	Percentage
Food Secure	28,791	91.04
Low Food Security	2,527	7.99
Very Low Food Security	306	0.97
Total	31,624	100.00

Notes: This sample contains the 31,624 observations (for 15,812 people) we have matched across December CPS data for 2001-2011. All observations are 15 to 19 years old in both years (i.e. those who transition from 14 to 15, or 19 to 20, are not included). This table does not include those with missing or “not in universe” values for child food security. The child food security variable is based on 12-month recall; we constructed it from the raw score (HRFS12M6) using the same method that (in some years of the data) was used to construct a composite variable (HRFS12MC).

Table 2: Descriptive Statistics

Fraction who are:		
employed	0.243	(0.429)
married	0.004	(0.064)
female	0.487	(0.500)
Highest grade completed (%)		
<= 8 th	7.32	
9 th	20.77	
10 th	29.83	
11 th	23.58	
12 th – not grad	3.86	
12 th – grad	8.00	
> 12 th	6.64	
Race Distribution (%)		
white	80.34	
black	12.97	
other race	6.69	
Mean:		
household size	4.50	(1.44)
age	16.61	(1.13)

Notes: All estimates use CPS family weights

Table 3: One-Year Transitions Across States of Children’s Food Security

Initial Status	Status, one year later			Total
	Children: Food Secure	Children: Low FS	Children: Very Low FS	
Children: Food Secure	13,612 [95.06]	654 [4.57]	53 [0.37]	14,319 [100.00]
Children: Low FS	801 [60.36]	472 [35.57]	54 [4.07]	1,327 [100.00]
Children: Very Low FS	59 [35.54]	74 [44.58]	33 [19.88]	166 [100.00]
Total	14,472 [91.53]	1,200 [7.59]	140 [0.89]	15,812 [100.00]

Notes: See sample description below Table 1. Numbers in cells are frequencies, with row percentages in brackets.

Table 4: Distribution of Food Security Conditional on Teen Employment

Children’s Food Security Status	Employed		Total
	No	Yes	
Food Secure	21,132 [90.23]	7,659 [93.36]	28,791 [91.04]
Low FS	2,023 [8.64]	504 [6.14]	2,527 [7.99]
Very low FS	265 [1.13]	41 [0.50]	306 [0.97]
Total	23,420 [100.00]	8,204 [100.00]	31,624 [100.00]

Notes: See sample description below Table 1. Numbers in cells are frequencies, with column percentages in brackets.

Table 5: Estimated Relationship between Teenage Employment and Food Security

	(1)	(2)	(3)	(4)
	Low or Very Low Food Security		Very Low Food Security	
	OLS	FE	OLS	FE
employed	-0.0217*** (0.00419)	-0.0100* (0.00604)	-0.00439*** (0.00118)	-0.00539** (0.00228)
age	0.0150*** (0.00319)		0.00268** (0.00122)	
married	0.0534 (0.0388)	-0.0817* (0.0474)	-0.0106*** (0.00128)	-0.00319 (0.00557)
Highest grade completed				
9 th	-0.0294*** (0.00925)	-0.00744 (0.00968)	-0.000470 (0.00321)	-0.00126 (0.00448)
10 th	-0.0488*** (0.00923)	-0.0146 (0.0104)	-0.00679** (0.00308)	-0.00469 (0.00467)
11 th	-0.0661*** (0.0104)	-0.0160 (0.0114)	-0.00890** (0.00356)	-0.00432 (0.00520)
12 th – not grad	-0.0600*** (0.0148)	-0.0344** (0.0163)	-0.0114** (0.00454)	-0.0127* (0.00708)
12 th – grad	-0.0814*** (0.0135)	-0.0280** (0.0142)	-0.0105** (0.00475)	-0.00787 (0.00614)
> 12 th	-0.107*** (0.0139)	-0.0267* (0.0150)	-0.0162*** (0.00466)	-0.00968 (0.00627)
female	-0.00356 (0.00382)		-0.00101 (0.00128)	
black	0.0999*** (0.00771)		0.0134*** (0.00286)	
other race	0.0257*** (0.00806)		0.00504* (0.00273)	
household size	0.0102*** (0.00157)	-0.00702 (0.00610)	-1.07e-05 (0.000539)	-0.00153 (0.00179)
constant	-0.149*** (0.0501)	0.145*** (0.0298)	-0.0326* (0.0194)	0.0223** (0.00951)
Observations	31,624	31,624	31,624	31,624
R-squared	0.023	0.001	0.006	0.001
Mean(dep var)	0.0896		0.0097	

Notes: All estimates use CPS family weights, and OLS estimates include year indicators. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimated Relationship between Lagged Teenage Employment and Food Security

	(1)	(2)
	Low or Very Low Food Security	Very Low Food Security
employed _{t-1}	-0.0199*** (0.00592)	-0.000774 (0.00188)
age	0.0141*** (0.00500)	0.00326* (0.00184)
married	0.0334 (0.0530)	-0.0112*** (0.00210)
Highest grade completed		
9 th	-0.0316*** (0.0104)	-0.00381 (0.00371)
10 th	-0.0465*** (0.0112)	-0.00925** (0.00391)
11 th	-0.0573*** (0.0144)	-0.0102* (0.00528)
12 th – not grad	-0.0268 (0.0254)	-0.0148** (0.00699)
12 th – grad	-0.0828*** (0.0200)	-0.0131* (0.00728)
> 12 th	-0.0838*** (0.0211)	-0.0238*** (0.00585)
female	-0.00529 (0.00559)	-0.00141 (0.00190)
black	0.108*** (0.0112)	0.0161*** (0.00415)
other race	0.0295** (0.0121)	0.00809* (0.00434)
household size	0.0141*** (0.00236)	-9.23e-05 (0.000842)
constant	-0.155** (0.0768)	-0.0402 (0.0286)
Observations	15,812	15,812
R-squared	0.026	0.007
Mean(dep var)	0.0896	0.0097

Notes: All estimates use CPS family weights and year indicators. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1