but also considers a period of tremendous economic growth and the profound social and program changes associated with the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996.

Theory: Poverty and Food Insufficiency

Poverty and food insufficiency are two ways to describe economic hardship. A brief theoretical analysis helps to illustrate the ways in which these outcomes are related but also different. To keep the focus on poverty and food insufficiency, the model takes the household's income and needs as given. Sawhill (1988) and others have discussed how income and needs are affected by short-term economic factors such as employment availability and wage levels, long-term economic factors such as education and training, demographic factors such as marriage, fertility, and migration, and programmatic factors such as tax rates and public assistance benefit levels. These are important determinants, and the study examines them in the subsequent empirical analysis. However, for simplicity, the theoretical analysis abstracts from them.

The Model

The theoretical analysis is based on a simplified, two-period version of a household life-cycle model, similar to the model considered by Gundersen and Gruber (2001). In our model, the household has time-separable preferences defined over its consumption of food, F_t, and all other goods, C_t, in each period ($t = 1, 2$) so that:

$$U = U_1(F_1, C_1) + \beta U_2(F_2, C_2)$$

where β ($0 < \beta = 1$) is a discount rate (rate of time preference) and $U_t(\bullet , \bullet)$ is the preference function (sub-utility) for period t. The needs of the household over time are assumed to be captured by the preference function.

To characterize the resources available to the household, the model assumes that the household begins period 1 with assets A and receives income in each period, Y_t, resulting in a budget constraint (without discounting) of $A + Y_1 + Y_2$. It also assumes that the household must pay a price of p_F for each unit of food. For convenience, food is priced relative to units of other consumption and assumed not to change over time. Unlike the Gundersen and Gruber model, there is no uncertainty—the household knows its income, the price of food, and all other relevant variables for both periods in period 1. The household chooses levels of food and

other consumption in each period to maximize utility subject to its budget constraint.

The Household Is Able To Borrow and Save

We first consider the implications of this model if the household is free to borrow and save in the first period. Specifically, assume that the household can do so at an interest rate r, and that any loans must be paid off in period 2. With these assumptions, the household has a two-period budget constraint, expressed as:

$$p_F F_1 + C_1 + (p_F F_2 + C_2)/(1+r) \leq A + Y_1 + Y_2 /(1+r).$$

The ability to borrow and save means that the household can smooth consumption. Consumption in each period depends on the total amount of income available in both periods, not just the income in that period; a low level of income in one period can be offset by a high level of assets or income in the other period. This implies that an isolated instance of poor income (that is, very low income in one period) will reduce food consumption but need not lead to an acute reduction, other things held equal.

Food insufficiency can nonetheless occur in this model. For instance, a household with few assets and low levels of income in both periods would experience correspondingly low levels of consumption.

The Household Has Constraints on Borrowing and Saving

If the household is constrained in its ability to borrow and save, the implications are different. In the extreme case where borrowing or saving are not possible, consumption in each period depends on that period's resources. A drop in income will lead to a relatively large contemporaneous reduction in consumption—that is, poverty and food insufficiency will be tied more closely together. In the more realistic case where households are not restricted in their ability to save but are somewhat restricted in their ability to borrow (e.g., constrained by the ability to obtain credit or by the credit limit on a charge card), the timing pattern of income changes becomes important. The household can smooth consumption if it starts with a high level of assets or receives a large income in the first period, but is less able to do so if it does not receive a large income until the second period.

Implications of the Model

Clearly, this model abstracts from many crucial features other than the determinants of income and needs,

such as unexpected price and income changes, multiple periods, actual production of meals, household composition, and time dependencies.[3] Still, it provides a useful framework for motivating the empirical models and interpreting patterns in the data. In particular, it shows that a household's food consumption is not only related to its current income but also to its past and future income, its ability to borrow and save, and its needs and preferences. For instance, a household experiencing a temporary spell of poverty may be able to smooth food consumption over time and maintain food sufficiency, if it is not liquidity constrained. Thus, we might observe households that are poor but food sufficient. Alternatively, a household with exceptionally high food needs might report being food insufficient, even if its income is above the poverty threshold.

Data

The study draws its data for the empirical analyses from the 1993 panel of the Survey of Income and Program Participation and the follow-on Survey of Program Dynamics. The SIPP is a large, national longitudinal survey conducted by the Census Bureau. The 1993 panel interviewed individuals every 4 months over nine waves from Winter 1993 until Fall 1995. In each wave, the SIPP asked people about their work behavior, income receipt, program participation, and family structure. In the final wave, the survey also collected information about basic needs, including food sufficiency.

The SPD is a follow-on to the 1992 and 1993 panels of the SIPP and consists of people who were either original respondents in those surveys or who were living with original respondents. The SPD is an annual longitudinal survey that is designed to capture the changes in income, labor supply, household composition, and program participation that are necessary for evaluating the impacts of PRWORA. The annual interview in 1998 asked questions about food sufficiency and food security in addition to the regular core questions about economic and demographic status. (See appendix A for more information on the SIPP and SPD.)

The linked data from the SIPP and SPD are useful because they permit us to examine food sufficiency and poverty for individuals at two different points in time. For poverty status, longitudinal data are available from several other surveys; for overall food consumption, they are available from the Panel Study of Income Dynamics (PSID). Although the PSID included food sufficiency questions in the 1999 and 2001 waves, the data have just recently become available. The SIPP and SPD also have other useful features, such as detailed information on different sources of income.

The advantages of using the SIPP and SPD need to be balanced against several difficulties, however. The main difficulty in working with these data is the complex structure of the underlying files. The present analysis required us to link together data from two large files from the SIPP (the Longitudinal file and the Wave 9 Topical Module file) and three files from the SPD (the Longitudinal File, the 1998 Experimental File, and the 1998 Food Security Status File). Another difficulty is that the data from the SPD 1998 Experimental File are unedited. The two SIPP Files and the Longitudinal SPD File were edited by the Census Bureau for consistency; however, the 1998 Experimental SPD File was not. The lack of editing means that it is not possible to link some people from the Experimental File to their records in the other files. It also means that some individual responses are either missing or inconsistent.

A final difficulty is the unusual sampling pattern for the SPD. Like all longitudinal surveys, the SIPP and the SPD suffer from sample attrition. However, the attrition problems in the SPD are especially severe because the survey did not immediately reinterview respondents from the SIPP (the first SPD "bridge" interview took place in March 1997); this large time gap meant that some participants could not be located. Also, the SIPP purposely dropped a large number of respondents in 1998 for budgetary reasons. The SPD does, however, include sample weights, which account for the representation problems associated with attrition and the cut in the sample. All of the empirical analyses in this study make use of these weights. Unfortunately, the weights do not account for observations that are dropped because of item nonresponse and linking problems in the experimental SPD file. Because of these various problems, estimates in the study may not be nationally representative. Also, there is no easy way to aggregate the study's statistical results up to population levels (for example, to estimate the number of people in the United States experiencing poverty or food insufficiency).[4]

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[3]Gundersen and Gruber (2001) considered some of these issues. In addition, Mariger and Shaw (1993) considered uncertainty and multiple time periods in their analysis of food consumption; Dynan (2000) considered habit formation, and Rose et al. (1998) considered a household production model of nutritional intake.

[4]For estimates of the levels of food security of different demographic groups, see Nord et al. (2002).