

New Population-Level Measures of Economic Dependency and Gender Inequality

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ABSTRACT

Economic dependency is typically understood as a household-level relationship in which shifts toward greater dependency for one member are commensurate with shifts toward less dependency for the other member(s), and equality is defined as equal contributions. We propose a new measure that defines economic dependency separately for men and women and defines gender equality as equal levels of dependency for men and women in the population as a whole (rather than equal contributions in individual households). Thus the new measure defines economic dependency and gender equality as population-level characteristics much like income inequality. Like other population measures, the proposed measure is accessible on one level while containing detailed decomposition properties that show how family formation practices (such as assortative mating, family structure, and marriage patterns) are associated with economic dependency, often in ways that are the inverse of the association with income inequality. A range of alternative and counterfactual estimates are provided but all show very different and non-commensurate levels and trends in economic dependency for men and women between 1970 and 2000, with virtually no change for men during this period despite the large increase in wives' earnings.

INTRODUCTION

Although women's financial contribution to family income has grown dramatically over the past several decades, men's contributions continue to predominate. According to figures presented below, the average share of white couples' earnings provided by wives doubled from 1970 to 2000, from 14 to 31 percent. This leaves 70 percent accounted for by men's contribution. The distribution of married couples tells a similar story. In 2007, men's earnings exceeded women's earnings in 85 percent of all married couple families (U.S. Census Bureau 2008). Using a more detailed classification, Raley, Mattingly, and Bianchi (2006: 11) found that "husbands were still the sole (25 percent) or major provider (39 percent)" in the large majority of couples (in 2001), where major provider is defined as contributing 60 percent or more of family income. Wives, by contrast, were the primary or sole earners in 12 percent of couples. When examined over time, even fewer wives maintain their status as primary earners for a period of five consecutive years (Winslow-Bowe 2006).

Men's large contribution to family income raises the questions of exactly how much men's reliance on spousal earnings has increased, exactly how much women's has decreased, and whether the two have shifted to the same degree (though in opposite directions). It is difficult to answer this question with existing measures of economic dependency. The most widely used measure – women's own income as a share of couples' total income – is defined for the couple as a whole rather than for each partner separately.¹ For example, an increase of 10

¹ Similarly, the influential variant of this measure developed by Sorensen and McLanahan (1987: 663) is scaled so that one member in the couple is defined as dependent, the one who contributes less than half of combined income, and the other as independent. The measure ranges from -1.0

percentage points in the measure simultaneously represents a 10 percentage point increase in women's share and a 10 percentage point decrease in men's. To see (and quantify) that this represents a non-commensurate change in levels of dependency for men and women, however, one needs to take the further step of comparing this 10 percentage points to the original shares for men and women. To continue the example, if women's share was 30 percent and increased to 40 percent, then women's dependency would have decreased by a third ($10/30$) while men's dependency would have increased by a seventh ($10/70$). This is straightforward enough to do, but the single "relative resources" measure is typically used on its own as a key predictor of marital quality and other outcomes (e.g., Rogers and DeBoer 2001). Although this is an extremely important area of research, it can obscure changes in the nature and extent of economic dependency that are not symmetrical for men and women.

Although not interested in the issue of dependency per se, Light (2004) provides an alternative approach that focuses on the gains or losses from union formation relative to income preceding union formation for each member of the couple separately. Light argues that research on income gains from pooling resources has focused on women's gains from men's earnings in marriage, while research on earnings premiums has focused on men's gains from specialization and women's losses from specialization. The missing cell is men's income gains from women's earnings in couples. Upon entering marriage, Light found that women's earnings decline and

to +1.0 with 0 indicating equal incomes. Positive values occur when women's share is less than half the total and negative values occur when women's share is greater than half. The measure is defined as $(\text{husband's income})/(\text{husband's income} + \text{wife's income}) - (\text{wife's income})/(\text{husband's income} + \text{wife's income})$. This is equivalent to $(1 - 2 * (\text{wife's income})/(\text{husband's income} + \text{wife's income}))$.

their total family income increases by nearly half but that men's total family income is unchanged once adjusted for family size. For men the gains from women's earnings fully offset the losses from additional family members, leaving their economic position unaltered from when they were single (though of course better than they otherwise would be without wives' earnings). It is not clear from Light's longitudinal research, however, how much of a change this represents from earlier decades when wives' contributions were much lower.

To further explore these gender differences in reliance on spousal earnings and income, we develop separate but comparable measures of dependency for men and women. Our starting point is the basic approach employed by Light and others, which is to compare an individual's gains or losses from income pooling to their financial well-being without income pooling (Light 2004, Bradbury and Katz 2003). We adapt this method to offer a third alternative, however, which is to study economic dependency as a population-level characteristic, much like income inequality and mobility are measured (Karoly and Burtless 1995; Martin 2006; Page and Solon 2003; Solon 1999). Drawing from that literature, the population-level measure that we propose is the correlation between own earnings and total family income, calculated separately for men and women. We briefly describe this measure in the next section before providing a more detailed discussion of the relevant literature on economic dependency in the following section.

NEW MEASURES

The correlation of own earnings and total family income has analytical properties and conceptual implications that are well-suited to the study of economic dependency. Analytically, the correlation represents the similarity between the relative standard of living derived from an adult's own earnings and the relative standard of living derived from their total family income. It

also represents the uniformity in the relationship between the two in the population as a whole. Under realistic assumptions about the distribution of women's and men's own and total family income,² similarity and uniformity will tend to be greater when partner earnings are small relative to own earnings. This is the traditional arrangement for husbands, in which own earnings is a clear signal of family income because of husbands' greater attachment to the workforce and greater earnings relative to wives. By contrast, similarity and uniformity will tend to be diminished when partner earnings are likely to augment own earnings quite substantially and unpredictably (i.e., without perfect income homogamy). This is the traditional arrangement for wives, in which own earnings is not a clear signal of family income. Thus a high correlation will indicate less reliance on spousal earnings while a low correlation will indicate greater reliance on spousal earnings. The ratio of the female-to-male correlations then forms a measure of gender inequality in the degree of dependency.

A key conceptual implication of this population-level measure is that gender in/equality can be defined as a property of the distribution of households rather than the individual household unit. For example, gender equality can result from a distribution of households in which partners contribute equally in every household. The correlation of own earnings and total family income will equal 1.0 for both men and women, reflecting the same degree of reliance on spousal contributions. Alternatively, equality can result from a distribution of households in which half are composed of female sole providers and half are composed of male sole providers, and all else is equal (i.e., income levels and family sizes). In this event, the correlations for men

² For example, the following does not hold when there is perfect assortative mating. In this and other discussions of hypothetical distributions, we illustrate our method with simple distributions but our discussion is based on more extensive simulations.

and women will be less than 1.0 to reflect heterogeneity in the relationship between own earnings and family income. Nevertheless, the correlations for men and women will be the same, reflecting the same degree of reliance. Equality can therefore be defined in the form of either the first or second distribution (or other possibilities); the only requirement is that the degree of dependency is equivalent for men and women.³

This particular population-level measure differs from the household-level “relative resources” measure of economic dependency in three important respects. First, it is transparent about the levels of dependency among women and men, as represented by the separate correlations. Second, it is flexible in its normative definition of gender equality, explicitly rewarding diversity and choice of family forms (including efficiency through complete specialization under the given conditions) as well as equality within families (Breen and Cooke 2005). And, third, it has decomposition properties in its covariance form that are useful in a number of ways. We describe two here.

First, these decompositional properties can be used to extend the study to all households and families, regardless of the marital status of the head. This enables us to assess how the growing number of single households or the changing significance of marital status in the labor market affects changes in dependency in the population as a whole (i.e., not just among the

³ The relative resources measure also results in equality for both distributions. However, a weakness of this measure is that it is insensitive to differences in *absolute* income between family forms and men and women (Oppenheimer 1997). In the second distribution described above, the average share of couples’ earnings provided by wives would equal 0.50, an indication of equality, even when families with female sole providers earn less than families with male sole providers. This is not true of the correlation measure that we propose.

married) (Cancian and Reed 1999). Both of these factors have been linked to women's growing "independence" and to changes in the nature of gender discrimination and inequality (England 2001; Budig and England 2001). Second, the decomposition properties can be used to account for the role of factors such as assortative mating and family structure in affecting levels of dependency. Frequently these factors are studied with respect to levels of family income inequality, but they turn out to be central to understanding levels of dependency as well. Indeed, these factors can have the opposite effect on levels of dependency than they have on levels of income inequality. We therefore provide an integrated framework for identifying the key factors that affect levels and trends in economic dependency. We should emphasize, however, that we do not see the population-level approach as a substitute for either the individual-level approach (e.g., Light 2004) or the relative resources approach. Causal and behavioral analysis at the individual and household levels is both necessary and valuable.

We begin below by elaborating briefly on some of the conceptual issues just raised. In particular, we discuss research on economic dependency that expands the definition of dependency beyond a focus on gender disparities yet is also consistent with our more flexible conceptualization of gender inequality. We also identify the factors that may be associated or confounded with changes in levels of dependency, such as changes in marriage, household composition, and assortative mating. We follow with a description of the correlation measure and the decomposition that identifies the impact of these factors. The results then show the degree to which levels of dependency have changed from 1970 to 2000 for women but not for men, despite the large increase in wives' earnings. The conclusion discusses questions raised by the new measures as well as new directions for research.

DEFINING DEPENDENCY

The question first raised in the literature on dependency is whether women's dependency on men's paid labor carries greater costs (risks and vulnerabilities) than men's dependency on women's unpaid labor, even if the arrangement can be beneficial for many reasons and for both partners (Becker 1981; Sorensen and McLanahan 1987). The costs of having fewer financial resources of one's own have been examined extensively and include less bargaining power in the decision to marry and in the marital relationship, as well as greater economic vulnerability in the event of dissolution and discrimination in the labor market (England and Farkas 1986; Lundberg and Pollack 1996; Smock, Manning, and Gupta 1999; Waldfogel 1997). The lever that lowers these costs for women and leads to greater equity in couples is an increase in women's labor force participation and earnings, often referred to as an increase in women's economic independence.

At the same time that women's labor force participation was rising, however, a number of now well-known exogenous (to varying degrees) changes took place that complicated the picture of women's advancing economic independence. The economic position of men in the bottom half of the wage distribution weakened in absolute terms and relative to men in the top of the distribution and to women throughout the distribution. Economic inequality also widened among women and among families beginning in the late 1970s (Moffit 2000; Gottschalk and Danziger 2005). A number of transformations in family formation practices also occurred, including an increase in the age of first marriage and increases in cohabitation, single parenthood, and divorce. These led to a variety of new family forms and to more time spent outside of marriage

than had been the case in the post-WWII era (Mason and Jensen 1995; McLanahan and Casper 1995).

In this environment, defining economic independence and dependence became more difficult. To the extent that women's increased hours, contributions to family income, and single parenthood were connected to men's deteriorating earnings, rising economic "independence" might not offer an adequate description of women's changing economic status (Garfinkel and McLanahan 1986; Oppenheimer et al. 1997; White and Rogers 2000). This was considered especially true for low and middle income women, even if they were equal providers.

Oppenheimer (1997:445) argued that "what is really being measured is how *symmetrical* the economic dependency is," since it was becoming more difficult for "single earners and married couples with a more traditional division of labor to achieve the same level of living as the two-earner family." In the literature on dependency, this line of argument marked a shift away from conceptualizing marriage primarily in terms of the costs of dependency for women (though this remains of interest). Instead, greater emphasis was placed on the benefits of forming financially interdependent households that pool risks and realize economics of scale for both men and women in an insecure economic climate, particularly for those who are the most economically vulnerable.⁴

We employ a definition of dependency that draws from this broader conceptualization, incorporating both gender disparities and pooling interdependencies. Following Oppenheimer, we use dependency to describe the state of being in a relationship in which earnings are pooled, ranging from completely unequal to completely equal contributions, and with the former defined

⁴ Wives earnings did help to maintain the standard of living of the median family and reduce overall levels of income inequality (Cancian et al. 1993).

as a relationship of greater dependency than the latter. We therefore describe all relationships among couples as having some degree of dependency, even though one member may have a more dependent position than the other. Following the measure developed by Sorensen and McLanahan (1987), we add to this a further indication of whether the dependency is borne primarily by women or men (as their measure makes clear by its positive or negative sign). This will be apparent in the separate measures for men and women.

With this broader definition in mind, we discuss two aspects of income pooling that have been discussed in the literature on income inequality but that also have implications for population levels of dependency. The first is assortative mating or income homogamy, which describes the form and pattern of income pooling among married couples. Income homogamy is of interest in the study of income inequality because of the increasing tendency for high income men and women to marry each other, which reinforces existing earnings inequalities (Cancian et al. 1993; Sweeney and Cancian 2004; Schwartz 2006). When income homogamy is considered in relation to economic dependency, however, we find the opposite association. Under the assumption that women are contributing nontrivial amounts to family income, higher levels of assortative mating will imply more equal contributions to family income by men and women and therefore lower and more equal levels of dependency. Although this describes current trends fairly well, we suggest that population levels of dependency can also be considered on par for men and women under conditions of low (and negative) assortative mating and high levels of dependency. This occurs when high/low income pairings are gender neutral so that they are equally likely to be composed of male and female sole providers who have similar incomes. In this context, income inequality will also be lower than under conditions of positive homogamy. Thus we can conceive of a scenario – albeit much different than existing circumstances – in

which both income inequality and gender inequality in levels of economic dependency are low, provided levels of economic dependency are high.

The second aspect of income pooling that has implications for economic dependency is the distribution of marriage among income groups. This too has received attention in the literature on income inequality because the rising share of single-parent households and the growing relative likelihood of marriage among the better off have both contributed to higher levels of income inequality (Goldstein and Kenney 2001; Edin and Reed 2005; Ellwood and Jencks 2004; McLanahan and Percheski 2008; Treas 1987). Here again the implications of these trends for levels of economic dependency are not the same as those for income inequality. A rise in the share of single households reduces the level of economic dependency in the population as a whole by reducing the share of dependent relationships. Similarly, an increase in the positive income bias of marriage reduces economic dependency by reducing the impact of marriage on one's relative economic position.⁵ Thus changes in marriage formation practices suggest that dependency is lessening for both men and women.

In sum, the definition of dependency and dependency-related issues has widened considerably in the past decade. The economic necessity of pooling income has gained attention as have the potential inequities that can be introduced by different forms of pooling (i.e., based on different patterns of marriage and assortative mating). Since income inequality is a

⁵ If only high wage persons marry and pool income, the relative economic positions (based on total family income) of high and low wage individuals remain similar. If only low wage persons marry and pool income, the relative economic positions of low wage individuals will rise. Consequently there would be more dependency in the latter distribution. Our proposed measure captures this difference.

characteristic of the population as a whole, a population approach is common in research on family income inequality. However, there is no analogous approach to studying the distribution of dependency, which is analytically distinct from the distribution of income itself and more germane to the study of the degree and form of income pooling in the population. At the same time, a population approach would provide an alternative and normatively flexible measure of gender disparities in levels of dependency. Thus our approach is motivated both by the increasing prevalence and importance of income pooling and by ongoing patterns of gender inequality in the labor market and in the household division of labor.

METHODS AND DATA

The Correlation

We begin by describing (in greater detail than earlier in the paper) how the proposed measure would capture a hypothetical traditional gender division of paid and unpaid labor in which some wives are paid workers. In this hypothetical scenario, the vast majority of prime-age adults are married and the husband is the sole or major provider. A nontrivial minority of wives work in a narrow range of occupations that pay significantly less than occupations in which men work. These women are more likely to be married to men with lower incomes but assortative mating among dual-earner couples is quite low given the relative lack of differentiation in pay among women. Although most adults are married, some men and women are single. The men earn comparable but slightly lower pay than married men and the women earn more than married women because their higher skills lead them to choose work over marriage.

In this scenario, the proposed measure – the association between own earnings and total family income – is high among men and low among women, representing differential degrees of

dependency. Because family income is composed overwhelmingly of men's earnings, men's position in the distribution of earnings does not diverge very much from their position in the distribution of family income; in fact, the two distributions are nearly identical, even when all men (married and single) are included in the analysis. Although women contribute to family income, their contribution is not enough relative to men's earnings to significantly alter men's economic position. Moreover, uniformity in the relationship between own earnings and family income is maintained among men as a whole because married men have higher earnings than single men, as well as higher family income.

In contrast, women's position in the earnings distribution is weakly associated with their position in the family income distribution, which is heavily influenced by transfers from husbands or from other sources (e.g., the government). Because women work in a narrower range of jobs and have a narrower and lower range of pay, there is less differentiation among them that would lead to a clear process of positive assortative mating. Indeed, there is a tendency for women's labor force participation and earnings to be negatively associated with their husband's earnings (Goldin 1990; Juhn and Murphy 1997). When married and single women are included in the analysis, the negative relationship between own earnings and family income is strengthened because married women's earnings are lower than single women's earnings yet their family income is greater, due to the gender earnings gap between married men and single women. That is, single women have high earnings but low income relative to married women. Still, there will be some single and married women who have both high (low) relative earnings and income and thus exert a positive influence on the correlation. Overall, women's correlation is dominated by dependency (married women's low earnings relative to men and single women) and by non-uniformity in the relationship between own earnings and total family income.

Based on this example, we distinguish among four factors that influence the degree of dependency as measured by the size of the correlation: the earnings of men and women, assortative mating, the composition of families and households, and the relative earnings of married and single individuals. As the earnings of men and women converge, assortative mating increases, the marital composition of the population declines, and the relative earnings of married and single individuals converge, the correlation will increase and dependency will decrease for women. On the men's side, it is difficult to find a plausible scenario that would result in increases in dependency that are proportionate to decreases among women. Of the changes that would increase women's correlation, two of them would also increase men's correlation: an increase in assortative mating and a decline in the marital composition of the population. A convergence in the relative earnings of married and single men would lessen the correlation, but research suggests that this is unlikely to happen (Cohen 2002). This leaves the growth in women's relative earnings (including labor supply) as the most important influence on men's correlation. In order for men's dependency to increase, then, women's earnings would have to grow enough to more than offset increases in assortative mating, single households, and married men's earnings.

The Covariance and Decomposition

These four factors are incorporated into the covariance decomposition. The covariance is measured with annual earnings and annual family income data for all 25 to 54 year-old heads and spouses in primary and secondary families (related and unrelated subfamilies), cohabitators, and primary and secondary individuals. It is also calculated separately for men and women and for 4 time periods: 1970, 1980, 1990, and 2000, in which the figures are calculated based on 3 years of

pooled data for each time point.⁶ All analyses refer to whites only, as racial differences in family formation practices are substantial. All other details of the data are provided in Appendix 1.

Suppressing gender and year indexes, the covariance measure is first decomposed as follows:

$$Cov(\textit{own earnings}, \textit{family income}) = \tag{1.0}$$

$$Cov(\textit{own earnings}, \textit{own earnings} + \textit{partner's earnings} + \textit{other family income}) = \tag{2.0}$$

$$Var(\textit{own earnings}) + \tag{2.1}$$

$$Cov(\textit{own earnings}, \textit{partner's earnings}) + \tag{2.2}$$

$$Cov(\textit{own earnings}, \textit{other family income}). \tag{2.3}$$

The advantage of this first level of decomposition is that the first and second terms of equation 2.0 (2.1 and 2.2) separately identify changes in the variance of own earnings and in the covariance of own earnings and partner earnings. The former provides a measure of changes in earnings while the latter provides a measure of assortative mating. The next level of decomposition identifies changes in family structure and female labor force participation by decomposing these first two terms into ANOVA/ANCOVA components for subgroups based on

⁶ Note that the covariance of own earnings and family income among women and among men make up the within-group components of the overall covariance when women and men are combined. Over 90 percent of the covariance among men and women combined is accounted for by these within-group components for men and women. The between-group component is both small and declining over time (from 8 percent in 1970 to 2 percent in 2000). Nevertheless, we tested our measures using ranks in the combined female and male earnings and income distributions and found similar results (see Appendix 3).

marital status and the employment status of wives. Six separate groups are examined (with abbreviations in parentheses): married, spouse present, wife employed full time (35 or more hours per week) and at least 40 weeks a year (*MFT*); married, spouse present, wife employed part time (*MPT*); married, spouse present, wife not employed (*MZ*); cohabitor (*C*); never married (*NM*); and other marital status, which includes divorced, widowed, and separated individuals (*O*). The variance and covariance components that are within each group and the components that are due to mean differences between these groups are superscripted with a *W* and *B* respectively in the ANOVA/ANCOVA subgroup decomposition, and the weights for each subgroup are indicated by a *w*.⁷ Eliminating zero terms, the full decomposition is:⁸

⁷ Recall that the between-group component in ANOVA is calculated as the sum of the squared deviations of each group mean from the grand mean, with each squared deviation weighted by the size of the group. The between-group component in ANCOVA is calculated as the sum of the product of deviations of the group mean from the grand mean for each variable (i.e., own earnings and partner's earnings), again weighted by the size of each group. Appendix 2 provides further details.

⁸ The omitted terms with a value of zero are: the covariances between own and partner's earnings for single individuals (the never married and other marital status categories). The covariance term for couples with zero-earning wives is maintained because it is non-zero when potential earnings are substituted for actual earnings (see below). The variance of own earnings in couples with zero-earning wives is zero for women but not for men, thus the term is maintained in the decomposition equation.

$$Cov(\text{own earnings}, \text{own earnings} + \text{partner's earnings} + \text{other family income}) = \quad (3.0)$$

$$w^{MFT} Var^W(\text{own earnings}^{MFT}) + \quad (3.1)$$

$$w^{MPT} Var^W(\text{own earnings}^{MPT}) + \quad (3.2)$$

$$w^{MZ} Var^W(\text{own earnings}^{MZ}) + \quad (3.3)$$

$$w^C Var^W(\text{own earnings}^C) + \quad (3.4)$$

$$w^{NM} Var^W(\text{own earnings}^{NM}) + \quad (3.5)$$

$$w^O Var^W(\text{own earnings}^O) + \quad (3.6)$$

$$Var^B(\text{own earnings}) + \quad (3.7)$$

$$w^{MFT} Cov^W(\text{own earnings}^{MFT}, \text{spouse's earnings}^{MFT}) + \quad (3.8)$$

$$w^{MPT} Cov^W(\text{own earnings}^{MPT}, \text{spouse's earnings}^{MPT}) + \quad (3.9)$$

$$w^{MPT} Cov^W(\text{own earnings}^{MZ}, \text{spouse's earnings}^{MZ}) + \quad (3.10)$$

$$w^C Cov^W(\text{own earnings}^C, \text{partner's earnings}^C) + \quad (3.11)$$

$$Cov^B(\text{own earnings}, \text{spouse's/partner's earnings}) + \quad (3.12)$$

$$Cov(\text{own earnings}, \text{other family income}) \quad (3.13).$$

The left side of Figure 1 provides a regrouping of the terms of equation 3.0 to correspond to three of the four factors that we distinguish in examining changes in levels of dependency (the fourth factor involves a reweighting of the data). The first factor is the variance of own earnings as represented by the *within-group variance* terms (3.1) to (3.6). Among women, these components will reflect the opening up of wider opportunities for employment in the form of expanding labor force participation and the growth of earnings. Among men, they will reflect

growth in the variance of earnings. The second factor is income homogamy and is identified in four *within-group covariance* terms: (3.8) for married couples with full-time employed wives, (3.9) for married couples with part-time employed wives, (3.10) for married couples with non-employed wives, and (3.11) for cohabitators. The third factor is the relative earnings of married and single individuals, which we rename “marital sorting”. This factor is measured as mean differences across marital status groups in the *between-group variance and covariance* terms, (3.7) and (3.12).⁹ Finally, the fourth factor is household and family structure. Holding composition constant at 2000 levels—by applying 2000 weights in all years—will yield an estimate of the change in the covariance that is unaffected by changes in household and family structure. A final component—the covariance between own earnings and other (non-spousal) sources of family income (3.13)—is increasingly important but still relatively small. Because space is limited, we do not discuss the results of this component in any detail.

⁹ The between group variance is always positive due to the squaring of mean differences. A decline in this component indicates a decline in the association of marital status with earnings levels. In contrast to the between-group variance, the between-group covariance can take on negative values, expressing a negative covariance between the mean of own and “partner’s” earnings. This negative effect reflects an inverse pairing of individuals and their “partners.” This occurs, for example, when zero-earning wives or part-time employed wives with below-mean earnings are paired with husbands with above-mean earnings; or when single women with above-mean earnings are paired with “partners” with zero earnings (terms for single individuals are included in the between-group covariance component). An increase in this component indicates a decline in negative pairing or an increase in positive pairing.

There are two additional features of the decomposition to note. First, changes over time in annual earnings will be due to changes in both labor force participation and earnings. The increase in the variance of earnings among part-time employed wives is due to increases in both hours and earnings, for example. The increase in variance in all other categories of married and single women will be due primarily to an increase in earnings or to a compositional shift into those categories from lower hours categories (i.e., from couples with non-employed and part-time employed wives). But these disaggregated categories will still subsume some changes other than rising earnings alone, such as an increase in lifetime work experience among full-time employed wives. To correct for this, we also estimate potential full-time earnings for all women and men.¹⁰ We match all individual earnings to the average earnings of those who are in the same education-by-age-by-sex-by-year cell but who work full-time, year-round (for men) and who also do not have children under the age of 18 (for women).¹¹ In effect this procedure

¹⁰ Because variances will be lower in the estimated data, we estimate potential earnings for all individuals so that this bias will be uniform across groups.

¹¹ The counterfactual group for women are women who work full-time, year-round and do not have children under the age of 18. We also examined never married women as a counterfactual group but they are much smaller in number than the group of all women without children under 18. Moreover, some never married women have children under 18 and these women earn substantially less than those without children under 18. The results are similar for the two counterfactual groups.

We use a detailed classification of education and age that does not include empty cells. Education consists of six groups based on years of education: 9-11, 12, 13-15, 16, and 17 and more (Lemieux 2006). Age consists of six groups of 5-year intervals: 25-29, 30-34, 35-39, 40-

reduces differences among women, among men, and between men and women to differences in earnings potential. This estimate also improves the measurement of dependency by providing a better indicator of the labor market position of married women if they did not have access to their husbands' income.

The second feature of the composition that bears some elaboration is the analytical distinction between the sorting and homogamy components. Among the married, the disaggregation into separate groups based on wives' employment allows for a distinction between the two processes of sorting and homogamy, respectively: (1) the negative pairing of high-earnings husbands and zero-earnings wives that occurs with complete specialization within or selection into marriage, and (2) the typically positive assortative mating among couples with observable earnings for wives. Without disaggregation, these effects would be combined in the within-group covariance or "homogamy" component for all married couples. We have analyzed the data both ways and believe that the more disaggregated approach is, for obvious reasons, the more transparent one. Even though our approach is not a causal or behavioral one, it is useful to think of the sorting components as capturing the negative sorting predicted by specialization and/or selection while the homogamy components capture the positive sorting predicted by the generally positive correlation between nonmarket productivity and market productivity (e.g., associated with education).¹²

44, 45-49, 50-54. Education-by-age cells are calculated for each year of data rather than for the pooled years. Similar matching techniques are used by Xie et al. (2003) and Black et al. (2008).

¹² According to Becker's model (1973: 833), wives with high nonmarket productivity who are married to husbands with high market productivity are likely to be high earners if they work, and their earnings would have to be very high to induce them to work. Becker therefore predicted

The presentation of results begins with a brief overview of descriptive trends and then describes changes in the correlation measure and the covariance decomposition over time. This is followed by a discussion of three alternative estimates: adjustments for family size, controls for compositional shifts in household and family structure, and estimates of potential full-time, year-round earnings for all individuals. Further alternative estimates and sensitivity analyses are presented in Appendix 3 but not discussed because they are consistent with the main results.¹³ The discussion section follows, in which we summarize the main results and discuss the ratio of male and female correlations as a measure of gender inequality.

RESULTS

Descriptive Trends

Raw data for the covariance decomposition are presented in Table 1, including trends in earnings and family income by marital status group and gender, compositional shifts in the distribution of family types, and assortative mating. Because our focus is on how these factors affect levels of dependency, we discuss descriptive trends only briefly.

Marital sorting is measured as the ratio of mean earnings and income among the marital status groups, shown just below the mean earnings and incomes figures. These ratios document

negative assortative mating on wage rates for all couples and positive assortative mating on wage rates for couples in which the wife is in the labor force.

¹³ The sensitivity analysis includes two additional alternative estimates. The first uses ranks in the combined male and female distributions in the calculation of the correlation measure, rather than actual earnings and family income in the gender-specific distributions. The second uses logged earnings and income distributions in the calculation of the correlation measure.

an increase in the relative mean earnings of married individuals (all groups combined) compared to the mean earnings of all individuals and the mean earnings of each of the three non-married groups. Married women's mean earnings rose from 27 percent to 73 percent of the mean earnings of never married women, and from 50 to 83 percent of the mean earnings of other single women.¹⁴ Upward trends in the men's ratios are also evident in Table 1, with the exception of cohabitators. For both men and women, then, the relative earnings of married individuals are increasing, though for women this involves a *decline* in marital status group differences (i.e., marital sorting) whereas for men it involves an *increase* in such differences. In both cases, the result is a decrease in dependency as negative pairing and sorting declines.

Well known cross-sectional, compositional shifts in family structure are evident in Table 1 as well. The weights that are used in the calculation of the covariance decomposition are estimates of these shifts in composition, which include not only a decline in marriage but a shift from households without employed wives to those with employed wives. As a share of all households among women, those with non-employed wives declined from 44 percent in 1970 to 16 percent in 2000. Cohabitators increased to roughly 5 percent of all households in both the men's and women's sample. Since 1990, the modal category for both men and women is the

¹⁴ The increase in married women's relative earnings is robust to a number of controls for compositional changes over time that may depress earnings among single women, such as a decrease in the share of never married women who have earnings and no children, which fell from 89.6 percent in 1970 to 69.6 percent in 2000. Restricting the sample to those who work, do not have children, and are in the same age range yielded similar growth in the relative earnings of married women. Other research confirms these patterns as well, both in the earlier period (Havens 1973; Treiman and Terrel 1975) and later period (Bianchi 1995:163).

married couple with a full-time employed wife, constituting 35 percent of all households in 2000, up from 20 percent in 1970. These shifts alone ought to affect the covariance of own earnings and family income simply by increasing the share of households in which own earnings is the sole source of income, thereby decreasing dependency for both men and women. Among those who are in couples, however, the impact on dependency will be affected by the degree of assortative mating.

Assortative mating has increased over the past three decades, but the figure varies in strength depending on the employment status of the wife. When all wives are included (zero earners as well), the correlation among spouses' earnings is low but it doubled from a negative 0.08 to a positive 0.09 between 1970 and 2000. Earnings homogamy among couples with part-time employed wives also doubled, from a positive 0.07 to 0.15. Earnings homogamy is considerably higher among couples with a full-time wife, but it also increased from a positive 0.20 to 0.28. Finally, earnings homogamy among cohabitators rose most dramatically, from a positive 0.06 to 0.35, though measurement error is no doubt high, especially in the earlier periods. For all groups, virtually the entire rise in homogamy occurred between 1970 and 1990, with very small declines during the 1990s in some cases. The shift toward more homogamous family types will increase the correlation between own earnings and family income, thereby decreasing levels of dependency.

The Correlation and Covariance Decomposition

The impact of these factors on both the covariance and correlation measures is shown in the remaining tables. Because covariances and variances lack an intuitive scale, the results are presented in the form of percentages, as the percentage of the total covariance accounted for by

each of the thirteen terms of equation 3.0. Figure 1 presents these percentage distributions in graphical form and Table 2 provides the correlations for the sample as a whole as well as for each of the subgroups. Table 2 also provides information on the contribution of each component to changes in the correlation over time. In most tables and figures, we present the results for 1970 and 2000 to limit the large volume of data and focus on our main findings.

Beginning with men, Figure 1 shows that 90 percent of the covariance between men's earnings and family income in 1970 is accounted for by the earnings of married men alone (exact percentages are shown in the bottom of Table 2). Almost three fifths of this is accounted for by husbands with non-employed wives (53.9 percent of the total covariance). This picture changes substantially over time. By 2000, married men's earnings constitute two-thirds of the covariance, and the earnings of husbands with non-employed wives constitute only a fifth of the covariance. There is no single other category that fully makes up for the decline in the relative importance of married men's earnings in the income distribution. Increases are spread more or less evenly across the components for assortative mating, marital sorting, earnings growth among single individuals, and the covariance between own earnings and other, non-spousal income.

These countervailing tendencies have a surprising effect: great turbulence in the components over time but essentially *no change* in the aggregate correlation. As shown in the top of Table 2, the correlation of own earnings and total family income is high, as expected, but also remarkably stable, declining by only 1.78 percent from 0.84 in 1970 to 0.83 in 2000. Among the married as a single group, there is a larger decline of 2.33 percent, but it is still quite small in substantive terms. The bottom of Table 2 provides the exact contribution of each of the components to changes over time in the correlation, expressed as a percentage of the net change

in the overall correlation.¹⁵ This is shown in the third column in the bottom half of Table 2. The positive (negative) values in this column indicate that the corresponding component changed in the same (opposite) direction that the overall correlation did. Since the overall correlation declined for men, a positive value indicates that the corresponding component also declined over time. Specifically, the figure of 2304.83 for husbands with non-employed wives indicates that 2,304.85 percent of the 1.78 decline in the overall correlation from 1970 to 2000 was due to a decline in this component (or roughly 23 times $-1.78 = 40$ percent). That is, the decline in this component, on its own, would have led to a 40 percent decline in the overall correlation between 1970 and 2000, leading to a much greater degree of dependency for men.

But this decline was almost fully offset by increases in homogamy, marital sorting, and the variances of earning among other groups of men (which includes compositional shifts toward single households). In particular, note the small but increasingly positive importance of assortative mating and marital sorting. The former increases from 2.2 percent of the total

¹⁵ Specifically, the equation for the numerator is: $(corr^{2000} - corr^{1970}) / corr^{1970}$, where $corr = cov / (sd^{OE} * sd^{FI})$, and sd^{OE} = the standard deviation of own earnings, sd^{FI} = the standard deviation of family income. The standard deviations are based on the grand variances for the entire sample of men or women. The covariance term for each year (i.e., cov^{1970} and cov^{2000}) is decomposed into its components, and then like components are differenced between years to calculate the change over time associated with each component. An example using the variance component for married individuals with a full-time employed wife is: $[(w^{MFT2000} var^{MFT2000}) / (sd^{OE2000} * sd^{FI2000}) - (w^{MFT1970} var^{MFT1970}) / (sd^{OE1970} * sd^{FI1970})] / corr^{1970}$. The sum of these changes over time for each component is the denominator for the percent change in the total correlation due to each component.

covariance to 6.8 percent (adding 1.74 and 0.47 in 1970, and 5.50 and 1.29 in 2000), whereas the latter increases from a small net negative effect in 1970 (-1.47 percent) to a small positive effect in 2000 (4.47 percent). Together with positive increases in the variance of earnings for unmarried men, these shifts would have led to a substantial increase in the correlation. Thus earnings, income, and family structure have changed dramatically for men, but in ways that would decrease dependency as well as increase it, resulting in little net change over time.

In contrast, the correlation among women is much lower and the net change over time is much greater and in the positive direction of reducing levels of dependency. For all women combined, the correlation more than doubled from 0.25 in 1970 to 0.52 in 2000. Also unlike men, the correlations vary in strength and trend across the marital status groups. Most of the increase in the correlation was concentrated among married women (57 percent increase over time), although the increase was just 20 percent for married women who work full time and 29 percent for those who work part time. The correlations are much higher among single women, particularly among the never married for whom family income is composed mostly of their own earnings. Among other single women, however, other sources of income play a more prominent role and thus the increase over time in the correlation represents a decline in the impact of other income sources.¹⁶

The covariance decomposition presented in Figure 1 and in the last three columns at the bottom of Table 2 demonstrates why the overall correlation increased. Like men, net positive

¹⁶ The percent of other single women receiving other income actually increased from 73 percent in 1970 to 86, 84, and 79 percent in the three subsequent decades. However, the *ratio* of other income to total income fell from 40 percent in 1970 to 38, 32, and 27 percent in the following decades.

changes in marital sorting and income homogamy among dual-earner couples were responsible for a boost in the overall correlation (and thus less dependency), but the significance and nature of those changes were much different for women. As Figure 1 makes clear, the earlier period was characterized by an extremely high level of marital sorting. This is reflected first in the component for mean differences in earnings among marital status groups (constituting 104.2 percent of the total covariance), and second in the component for mean differences in pairing among marital status groups (constituting -93.6 percent). The large positive between-group variance was driven in large measure by the presence of zero-earning wives while the large negative covariance by negative pairing. As a share of the overall total, these factors declined substantially over time but remained a net positive influence. Together with homogamy, they accounted for almost a third of the increase in the correlation for women from 1970 to 2000.¹⁷

Changes in marital sorting and homogamy are not the entire story, however. The growth in the variance of women's earnings within marital status groups over time also contributed to the increase in the correlation. If the increase in the within-group variance of earnings for all marital status groups is combined (adding the percentages for these components in the sixth column of the second panel), it accounts for a positive 65 percent of the increase in the correlation from 1970 to 2000. Over half of this is due to increases in the variance of earnings among full-time employed wives (35.2 percent). Most of the other half is due to an increase in

¹⁷ This is not only because of the decline in the share of zero-earning wives; it is also because of the decline in differences in mean earnings between other groups and their "partners" (e.g., never married women's mean earnings do not diverge nearly as much from the grand mean in 2000 as they did in 1970, and wives' and husbands' mean earnings do not diverge from one another as much because of the decline in the gender earnings gap).

earnings among single women. Whether these can be understood as changes in labor supply or earnings, however, will have to be determined once compositional shifts in family structure and labor supply have been controlled.

In sum, most of the factors identified here contributed positively and substantially to the more than doubling of the women's correlation between 1970 and 2000. This includes the growth in women's earnings within marital status groups, the decline in mean earnings differences among marital status groups and between "partners" (i.e., marital sorting), and the increase in assortative mating. In contrast, the small decline in the men's correlation was due almost entirely to one factor: the decline in the variance of earnings among husbands with non-employed wives. This single factor would have led to a 40 percent decline in the men's correlation but was almost fully offset by changes in all other components, each of which led to an increase in the correlation of roughly similar (and small) magnitude. Thus the apparent stability in the men's aggregate correlation belies the transformations that took place under the surface in the men's distribution, yet changes in earnings and family formation practices ultimately had a much greater impact on the extent of women's dependency than on men's.

Alternative Estimates

In this section we parse out the extent to which these changes in levels of dependency are due to changes in family size, changes in the composition of households, and changes in women's labor force participation. We examine the impact of each of these changes on its own. Three sets of estimates are presented in Tables 3 and 4 (for white men and white women, respectively). The raw data are adjusted for family size in the first set of estimates. The next two sets of estimates hold the distribution of marital status groups constant over time and then labor force participation

constant over time. Most of the discussion is devoted to the women's estimates, since the men's estimates continue to exhibit little change.

When earnings and family income are adjusted for family size, changes over time for women are reduced by about a third.¹⁸ The correlation would have increased from 0.42 in 1970 to 0.60 in 2000 rather than from 0.25 to 0.52. The correction for family size has more of an impact in the earlier period than in the later period because family size shrunk over this period. In the earlier period, the impact on the correlation is strongly positive because the earnings and income of individuals who are living with others are lower in the adjusted distributions, tempering the negative relationship between married women's relatively low position in their earnings distribution and their relatively high position in their family income distribution. By the same token, the earnings of single women play a stronger positive role because their earnings are less prone to downward adjustment. In the later period, however, marital sorting has a stronger negative effect than in the unadjusted figures because the gain in married women's relative earnings over time is attenuated by the correction for family members. Once family size is taken into account, dependency is less extreme in the earlier period but change over time is less dramatic. These patterns hold for men and women alike but once again exert a greater influence on women's levels of dependency than on men's.

Some of the same patterns are evident when compositional shifts in household structure are held constant by fixing the weights at their 2000 values while real changes in earnings

¹⁸ The adjustment is calculated by dividing each term in the covariance measure (i.e., own earnings, partner's earnings, and other family income) by $((F/H) * H^{0.5})$, where F equals the number of family members and H equals the number of household members (Karoly and Burtless 1995).

transpire over time.¹⁹ Among women, the increase in the correlation between 1970 and 2000 would have been smaller by about a quarter. The correlation would have increased from 0.32 in 1970 to 0.52 in 2000 rather than from 0.25 to 0.52. By fixing the 1970 distribution at the 2000 values, the relative influence of single households is elevated and the influence of husband-earner-only households is diminished. As in the corrections for family size, this has the effect of increasing the correlation in 1970 by increasing the earnings variance components for single women and decreasing the mean differences between married and single individuals in the marital sorting components.²⁰ However, the negative effect of marital sorting remains strong in the earlier period (as it did when family size was controlled). Even if the counterfactual procedure we use is a lower-bound estimate by half, shifts *within* groups would still account for half of the reduction in dependency among women over time.

¹⁹ All components with weights were recalculated with the fixed weights, including all within-group and between-group variance and covariance components as well as the standard deviations in the denominator of the correlations. Since 2000 terms were recalculated to maintain uniformity, there are small differences in the 2000 results across tables due to rounding. Fixing terms from different years will produce different outcomes, and counterfactual analysis does not account for endogenous behavioral shifts, so these counterfactual distributions should be taken as only one of a range of possible estimates of compositional effects.

²⁰ The earnings components of non-married groups were greater in the counterfactual distribution in 1970 because these groups were a larger share of the population. Earnings changed little between the two periods for women. For men, earnings variances actually declined (see the negative values in column six of Table 3).

The remaining question is how much of these shifts are the result of changes in female labor force participation and how much are the result of changes in earnings. We hold labor force participation constant over time by assuming that all individuals have high labor force attachment in both 1970 and 2000 (as described in note 11). The result reveals several interesting patterns. First, *both* men's and women's correlations now exhibit little change over time. Among women, the correlation would have increased only 16 percent, from 0.46 in 1970 to 0.54 in 2000, rather than from 0.25 to 0.52 in the unadjusted data. Consistent with the adjustment for family size (and by design for the adjustment for compositional shifts), the impact is greater in 1970 than in 2000. Negative pairing had a much larger negative effect in 1970 than in 2000, and this effect is eliminated once differences in labor force participation are eliminated. Mean differences in earnings among marital status groups have also disappeared. The contribution of married women's earnings to the positive correlation is now more commensurate with their share of the population.

Second, once the main source of extreme marital sorting is gone (i.e., low labor force participation among married women), the high degree of educational and age homogeneity becomes apparent, as it is converted directly into income homogeneity. High levels of income homogeneity account for almost half of the positive overall correlation in the earlier period (10.6 + 11.6 + 25.0 percent) and a third in the later period.²¹ Because earnings and homogeneity are strongly positive, the correlation among married women is high in absolute terms (0.61 in 1970 and 0.72 in 2000) and relative to that of married men (0.81 in 1970 and 0.83 in 2000). This is especially true in 2000, when the female/male ratio among the married is $0.72/0.83 = 0.87$, a

²¹ Homogeneity based on the correlation of spousal potential earnings is in the 0.54 to 0.59 range, which is equivalent to levels of spousal educational homogeneity.

difference due entirely to differences in the variances of earnings between married men and married women.

Third, while it is not surprising that full female labor force participation would result in much lower dependency among married women (in the context of high levels of income homogamy), a closer look reveals deepening and entrenched levels of dependency among the population as a whole. The estimates show substantially lower correlations among all men and all women than among only those who are married. This difference is much greater than in the unadjusted data. Moreover, while the men's overall correlation changed little over time, it is noticeably lower in absolute terms in both 1970 and 2000 than in the unadjusted data (by 10 percentage points), suggesting greater dependence under conditions of full female labor force participation. Similarly, the adjusted correlation for women in 2000 is virtually the same as it is in the unadjusted data, suggesting that current overall levels of dependency would not be reduced very much by further increases in female labor force participation.

These results are explained by the larger role that income pooling plays in determining the relative standards of living of married and single individuals, especially for men, under conditions of full female labor force participation. Heterogeneity increases among men as wives' earnings finally drive a more discernible wedge between the relative family incomes of married and single men *with similar earnings*. This heterogeneity reduces the correlation between own earnings and total family income. By the same logic, husbands' earnings retain their influence on the relative standard of living of married and single women, but in ways that increasingly resemble the dynamic among men. Thus it is necessary to use the population-level measure including all marital status groups, and incorporating comparisons between married and single individuals, to capture the growing degree of dependency among men that is expected to occur as

wives engage in full-time, uninterrupted paid work. The measure also captures a potential change in the source of dependency among women, in which patterns of income pooling replaces labor force participation as the main difference between being married and single.

DISCUSSION

Ranging from 0.73 to 0.87, the men's correlation is both high and relatively immune to changes over time and adjustments for family size and household structure. This stability is explained by a number of factors that served to *decrease* dependency over time, offsetting the *increase* in dependency implied by wives' growing earnings. The factors that decreased dependency over time include increases in assortative mating, single households, the variance of earnings, and the earnings of married relative to single individuals, all of which led to a decline in women's dependency as well. Only under conditions of full female labor force participation did men's correlation drop by a substantial amount (ten percentage points in both the earlier and later periods, so there was no change over time). This is the only compelling evidence we found that men's relative standard of living can be substantially altered by pooling income with women, given existing patterns of marriage, assortative mating, and gender earnings disparities.

Ranging from 0.25 to 0.60, the women's correlation is substantially lower and sensitive to adjustments for family size, family and household structure, and especially female labor force participation. But even when men's dependency is highest under the assumption of full female labor force participation, women's correlation is just three-quarters the size of men's correlation in the year 2000 (.53/.73). Since differences in marital sorting and income homogamy between men and women are minimal under these conditions, the gender gap in earnings emerges as the key difference between men's and women's dependency.

The ratio of men's and women's correlations thus provides a numerical measure of the disparity between the contribution that men's earnings makes to women's standard of living and the much smaller contribution that women's earnings makes to men's standard of living. This ratio is presented in Table 5 for married men and women, all men and women, and for all men and women with data corrected for family size. We also present the ratio of wives' earnings and couples' total earnings, which is the most common measure of gender inequality in the intra-household distribution of earnings and/or income. Both measures show an increase in gender equality over time. The ratio of wives' earnings to couples' total earnings doubled from 0.15 to 0.31 between 1970 and 2000. The ratio of women's and men's correlations based on spousal earnings only (and not other sources of family income) rose by nearly two-thirds, from 0.44 to 0.73. If we consider changes over time in the ratio of correlations among all men and women, the increase is greater, from 0.30 to 0.63. We provide other estimates as well, but it is notable that all estimates of the ratio of correlations in 2000 are in a fairly narrow range, from 0.63 to 0.74, including the estimate based on potential earnings. As discussed above, all of the adjustments mattered much more in the earlier period (1970) than in the later period (2000), suggesting that current levels of dependency are relatively entrenched.

In addition to allowing for greater transparency in levels of dependency for men and women, the ratio of correlations provides a more flexible conceptual definition of gender equality. This conceptualization is also informed by a more explicit consideration of the role that assortative mating (and other factors) plays in fostering in/equalities of different kinds. In particular, the correlation measure of gender equality does not normatively prioritize equality of earnings within couples, which assumes high levels of income homogamy. Instead, it prioritizes equal levels of dependency in the population as a whole (including single-person households),

even if levels of dependency are high, as might occur under conditions of negative income homogeneity. This conceptualization is flexible enough to encompass a wide range of theoretical perspectives: models of equality that stress equality *within* households (which implies higher levels of income homogeneity), models of equality that stress equality *across* households (which implies lower levels of income homogeneity), models of efficiency that stress specialization (though our conceptualization requires gender balance in roles and income), and models of choice that stress heterogeneity of household forms. The empirical analysis suggests that economic dependency in the contemporary U.S. is consistent with elements of each of these models, but especially the first and the third. Further empirical analysis can provide insight into the family formation patterns that constitute these different theoretical models.

CONCLUSION

The literature on women's dependency in marriage shows that much has changed, with women accounting for at least a third of all family income and sharing more equally in the financial responsibilities of individual households. Yet it is also the case that two-thirds of married couple families continue to rely exclusively or primarily on the husband's earnings, both because men's earnings are still higher on average than women's and because of women's childrearing responsibilities (Raley et al. 2006). So is the glass half full or half empty? Our main contribution is to provide an empirical foundation for answering this question. We empirically documented the extent to which men's and women's levels of dependency differ and the extent to which these differences have changed over time. We show that the fact that men's level of dependency increased at all (even slightly), despite countervailing pressures such as assortative mating and the increasing share of single households, can be considered an indication of women's increasing

impact on men's economic status, but it also underscores the continuing dominance of men's economic role in the labor market and in the family.

As our empirical analysis is only a first step in formulating and applying a new set of measures of economic dependency and gender inequality, there are a number of elaborations that would be fruitful. First, in defining economic dependency and identifying the relationship between economic dependency and other population dynamics, we alluded to a number of hypothetical distributions. For example, assortative mating emerged as an important and complex factor, potentially associated with a wide range of alternative outcomes. Thus one promising candidate for further exploration (via simulation) is the relationship between patterns of assortative mating and levels of economic dependency and income inequality. A second elaboration would to exploit the subgroup structure of the covariance/correlation measure to analyze economic dependency in greater demographic detail, taking age, cohort, fertility, education/class, and race/ethnicity into consideration. The approach we use is especially amenable to cross-national comparisons.

Third, our data set was selected because of its frequent use in studies of inequality, its relatively large sample size, and its availability over a long period of time and on an annual basis (though we did not exploit the annual data in this paper), but the CPS does have limitations. Like most other studies, we are unable to determine how income is distributed within families, which leads us to assume that total family income is the standard of living or well-being shared by all family members (Lundberg et al. 1997). While we cannot address this shortcoming with the available data, we think it is plausible that bargaining within households might itself be shaped by opportunities outside households (Breen and Cooke 2005). This suggests that a population-level measure of economic dependency could be helpful in illuminating this issue.

Another data limitation of ours is that we do not observe the income distribution before and after union formation takes place as in most behavioral analyses. Instead, the earnings distribution is used as the counterfactual distribution that would exist if individuals did not pool income, which is then compared to the family income distribution in which income is pooled. We have estimated potential earnings to correct for labor supply decisions that are affected by union formation, but data sets with more detailed information about work experience and education could provide more accurate estimates of potential earnings, as could panel data that measures income before and after union formation or dissolution. These data will result in greater precision, and should be pursued for that reason, but they are not likely to alter our results dramatically (i.e., produce greater changes in economic dependency than we find), because our estimate probably overstates the potential earnings of married women (in making them equivalent to the earnings of full-time employed women without children under 18). Among men, Light (2004) finds that the earnings premium from specialization in marriage is quite small compared to the simple addition of partner earnings (which we do observe with the CPS data). Thus since earnings are the primary source of income for employed adults, the cross-sectional earnings distribution should offer a reasonable indicator of economic well-being in the absence of income pooling.

Finally, there are aspects of our definition of dependency that we did not have the space to address but that deserve further attention. Our definition of dependency requires a discernable change from one's relative standard of living in the earnings distribution to one's relative standard of living in the family income distribution. This effectively recasts economic dependency as a process of relative mobility rather than absolute mobility. This may be why our measure seems to be implausibly insensitive to the impact of wives' earnings on men's

dependency. We are sympathetic to this critique and were surprised by our findings on this score. However, our analysis of potential earnings and our decomposition both provide a looking glass into alternative distributions that *would* alter the relative living standards of men as well as women. In addition, for the purposes of measuring stratification dynamics, our approach is an appropriate one because it captures the extent of mobility in the income distribution that is fostered by different patterns of income pooling. Finally, our findings are consistent with the large impact that men's earnings still have in shaping the family income distribution. For these reasons, we think that the mobility approach has a role to play in understanding economic dependency, even though it should not be the only approach employed. Although there are further issues to note, we leave these to future research on economic dependency.

Appendix 1: Description of Data

All data are derived from the Annual March Current Population Survey uniform files provided by Unicon for 1962 to 2005. All samples exclude individuals under 25 and over 55 in order to limit biases associated with school attendance and retirement. Couples with one partner in the age range and one outside the age range were excluded. The four time periods that are analyzed are referred to as 1970, 1980, 1990, and 2000 for short, but include three years of pooled data for each time period (1968-1970, 1978-1980, 1988-1990, and 1998-2000). Because annual earnings refer to the year before the survey, the surveys used in this study are 1969-1971, 1979-1981, 1989-1991, and 1999-2001. All analyses are weighted using CPS family weights.

Earnings and Income

Earnings are presented in inflation-adjusted 2000 dollars using the Personal Consumption Expenditures deflator and include self-employment earnings. Individuals in the armed forces are also included, although the results did not differ substantively when they or the self-employed were excluded. The data were topcoded by applying the same topcoded value to a consistent percentage of cases in each year. The percentage was calculated separately for wages and salaries, self-employment earnings, farm and other self employment earnings, and other family income (see Burkhuaser et al. 2004). All negative values are set to zero for annual earnings and family income. Other family income includes income from all other sources besides the earnings of individuals and their spouses or partners. This includes income from tax and transfer programs and earnings from other family members.

Families

All subfamilies and secondary families are included in the analysis. Families with adult, single children over age 25 are excluded because of the ambiguity they introduce in assessing their contribution to and access to family income (roughly 4 percent of the sample). Cohabitators are calculated using the method developed by Casper and Cohen (2000). Couples are defined as white if *both* partners are identified as white (and the same procedure is used for blacks). This insures that the sample sizes for married women are the same as the sample sizes for married men.

Appendix 2. Decomposition of the Covariance Measure

$$\text{Cov}(X,Z) = \text{Cov}(X, X + Y + W) = \text{Var}(X) + \text{Cov}(X, Y) + \text{Cov}(X,W),$$

where:

$$\text{Var}(X) = \frac{1}{df_t} \left[\sum_{j=1}^J \frac{df_j}{df_j} \sum_{i=1}^{n_j} (X_{ij} - \bar{X}_j)^2 + \sum_{j=1}^J df_j (\bar{X}_j - \bar{\bar{X}})^2 \right]$$

$$= \left[\sum_{j=1}^J \frac{df_j}{df_t} \sum_{i=1}^{n_j} \frac{(X_{ij} - \bar{X}_j)^2}{df_j} + \sum_{j=1}^J \frac{df_j}{df_t} (\bar{X}_j - \bar{\bar{X}})^2 \right]$$

$$\text{Cov}(X, Y) = \frac{1}{df_t} \left[\sum_{j=1}^J \frac{df_j}{df_j} \sum_{i=1}^{n_j} (X_{ij} - \bar{X}_j)(Y_{ij} - \bar{Y}_j) + \sum_{j=1}^J df_j (\bar{X}_j - \bar{\bar{X}})(\bar{Y}_j - \bar{\bar{Y}}) \right]$$

$$= \left[\sum_{j=1}^J \frac{df_j}{df_t} \sum_{i=1}^{n_j} \frac{(X_{ij} - \bar{X}_j)(Y_{ij} - \bar{Y}_j)}{df_j} + \sum_{j=1}^J \frac{df_j}{df_t} (\bar{X}_j - \bar{\bar{X}})(\bar{Y}_j - \bar{\bar{Y}}) \right]$$

i = index of individuals,

j = index of marital status groups,

t = individuals of all marital status groups,

df = degrees of freedom ($n-1$ or $N-1$),

J = number of marital status groups (6),

X = own earnings,

\bar{X} = mean of own earnings,

$\bar{\bar{X}}$ = grand mean of own earnings,

Y = partners' earnings,

\bar{Y} = mean of partners' earnings,

$\bar{\bar{Y}}$ = grand mean of partners' earnings,

W = other, non-partner income, e.g., from government transfers or capital income

Z = total family income from all sources

$w^j = df_j/df_t$ (e.g., $w^{\text{MPT}} = df^{\text{MPT}}/df^t$ in equation 3.0 in the text)

Appendix 3. Correlations of ranked and logged distributions among whites by sex, 1970 & 2000

	1970			2000		
	Regular correlation ^a	Rank correlation ^b	Correlation of logged distributions ^c	Regular correlation ^a	Rank correlation ^b	Correlation of logged distributions ^c
Women						
All	0.2485	0.1850	0.2822	0.5221	0.4623	0.4844
Married as one group	0.3694	0.3124	0.3938	0.5803	0.5327	0.5010
Married, wife works full time	0.5864	0.5521	0.4805	0.7029	0.6806	0.6516
Married, wife works part time	0.3856	0.3578	0.2735	0.4978	0.4610	0.3906
Married, wife doesn't work	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cohabitators	0.5285	0.5470	0.4815	0.7761	0.7722	0.6636
Never married	0.9694	0.8406	0.9651	0.9857	0.9228	0.9601
Other marital status	0.7227	0.5623	0.7305	0.9041	0.8501	0.8787
Men						
All	0.8404	0.7752	0.7995	0.8254	0.8044	0.8165
Married as one group	0.8300	0.7632	0.7736	0.8107	0.7843	0.7719
Married, wife works full time	0.8351	0.7989	0.7120	0.8235	0.7930	0.7626
Married, wife works part time	0.8768	0.8523	0.8163	0.8719	0.8470	0.8426
Married, wife doesn't work	0.9328	0.8562	0.8836	0.9435	0.8806	0.9189
Cohabitators	0.8475	0.7010	0.4938	0.8613	0.8375	0.7888
Never married	0.9803	0.8743	0.9776	0.9850	0.9250	0.9906
Other marital status	0.9695	0.8660	0.9806	0.9657	0.9089	0.9747

Notes : ^aCorrelations from Table 1. ^bCorrelations of ranks (out of 1,000) in combined male and female distributions. ^cCorrelation of logged (natural log) own earnings and logged total family income distributions with zero earnings and income observations omitted.

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Table 1. Sample characteristics by sex, 1970 & 2000: whites, ages 25-54 (in 2000 US Dollars)

	1970	2000	1970	2000
Means of own earnings, spouse earnings & total family income		Women	Men	
Grand mean, own	7589.59	22129.72	37040.80	43458.02
Grand mean, spouse	32340.88	34384.07	5819.75	15808.26
Grand mean, family	44159.90	62297.23	46599.48	64477.00
Married, own	6368.65	20552.81	37706.12	47304.05
Married, spouse	37706.12	47304.05	6368.65	20552.81
Married, family	48066.90	74730.74	48066.90	74730.74
Married, wife works full time, own	20059.20	33380.43	32954.43	44008.04
Married, wife works full time, spouse	32954.43	44008.04	20059.20	33380.43
Married, wife works full time, family	57187.16	83970.01	57187.16	83970.01
Married, wife works part time, own	6465.13	13572.67	36417.19	50571.73
Married, wife works part time, spouse	36417.19	50571.73	6465.13	13572.67
Married, wife works part time, family	46695.76	71489.40	46695.76	71489.40
Married, wife doesn't work, own	0.00	0.00	40542.05	50816.83
Married, wife doesn't work, spouse	40542.05	50816.83	0.00	0.00
Married, wife doesn't work, family	44539.47	57784.77	44539.47	57784.77
Cohabitators, own	10384.74	23196.26	24084.26	33643.02
Cohabitators, spouse	24084.26	33643.02	10384.74	23196.26
Cohabitators, family	35596.14	57864.35	34865.63	57886.17
Never married, own	23458.38	28321.93	29186.88	33442.23
Never married, spouse	0.00	0.00	0.00	0.00
Never married, family	24365.53	29495.39	29999.98	34158.44
Other marital status, own	12730.26	24794.46	31628.08	35577.47
Other marital status, spouse	0.00	0.00	0.00	0.00
Other marital status, family	19668.47	30280.89	33134.57	37526.91
Ratio of mean own earnings (married vs. all)	0.84	0.93	1.02	1.09
Ratio of mean family income (married vs. all)	1.09	1.20	1.03	1.16
Ratio of mean own earnings (married vs. cohab)	0.61	0.89	1.57	1.41
Ratio of mean own earnings (married vs. never married)	0.27	0.73	1.29	1.41
Ratio of mean own earnings (married vs. other)	0.50	0.83	1.19	1.33
Weights of own earnings				
Married	0.86	0.69	0.92	0.71
Married, wife works full time	0.20	0.35	0.22	0.36
Married, wife works part time	0.22	0.19	0.23	0.19
Married, wife doesn't work	0.44	0.16	0.47	0.16
Cohabitators	0.00	0.05	0.00	0.06
Never married	0.03	0.10	0.04	0.12
Other marital status	0.11	0.16	0.04	0.11
Correlation of own & spouse/partner earnings	1970	1980	1990	2000
Married, all (including husband-earner-only couples)	-0.0806	-0.0333	0.0746	0.0941
Married, wife works full time	0.1969	0.2220	0.3011	0.2779
Married, wife works part time	0.0675	0.0571	0.1731	0.1502
Cohabitators	0.0639	0.2071	0.3742	0.3637

Table 2. Correlation decomposition of own earnings and total family income among whites by sex, 1970-2000

	1970	1980	1990	2000	% Change, 1970 - 2000	
Correlation of own earnings & family income						
All White Men, ages 25-54	0.8404	0.8331	0.8296	0.8254	-1.78	
Married as one group	0.8300	0.8180	0.8169	0.8107	-2.33	
Married, wife works full time	0.8351	0.8365	0.8431	0.8235	-1.39	
Married, wife works part time	0.8768	0.8743	0.8885	0.8719	-0.56	
Married, wife not in paid work	0.9328	0.9184	0.9345	0.9435	1.15	
Cohabitators	0.8475	0.8591	0.8761	0.8613	1.63	
Never married	0.9803	0.9858	0.9812	0.9850	0.48	
Separated, Divorced, Widowed	0.9695	0.9668	0.9622	0.9657	-0.39	
All White Women, ages 25-54	0.2485	0.2814	0.4543	0.5221	110.10	
Married as one group	0.3694	0.4093	0.5471	0.5803	57.09	
Married, works full time	0.5864	0.5811	0.6819	0.7029	19.87	
Married, works part time	0.3856	0.3418	0.4779	0.4978	29.10	
Married, not in paid work	0.0000	0.0000	0.0000	0.0000	0.00	
Cohabitators	0.5285	0.6615	0.7594	0.7761	46.85	
Never married	0.9694	0.9693	0.9707	0.9857	1.68	
Separated, Divorced, Widowed	0.7227	0.7590	0.8681	0.9041	25.10	
Covariance components as % of total correlation and change in correlation, 1970-2000*						
	Men ($\Delta = -1.78\%$)			Women ($\Delta = 110.10\%$)		
Variance of own earnings	1970	2000	% Change	1970	2000	% Change
Married, wife works full time	15.63%	26.41%	-689.95%	27.51%	31.55%	35.20%
Married, wife works part time	19.13%	18.69%	47.97%	14.23%	8.43%	3.16%
Married, wife not in paid work	53.89%	19.52%	2304.83%	0.00%	0.00%	0.00%
Cohabitators	0.15%	3.47%	-217.38%	0.25%	4.70%	8.74%
Never married	4.06%	7.66%	-231.80%	8.87%	10.82%	12.58%
Separated, Divorced, Widowed	4.28%	7.24%	-189.87%	26.90%	15.61%	5.37%
Homogamy						
Married, wife works full time & spouse	1.74%	5.50%	-244.56%	9.61%	11.70%	13.60%
Married, wife works part time & spouse	0.47%	1.29%	-53.12%	2.62%	2.75%	2.87%
Married, wife not in paid work & spouse	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cohabitators	0.01%	1.01%	-65.61%	0.03%	2.14%	4.06%
Marital Sorting						
Earnings variance across marital status	3.53%	3.60%	-1.50%	104.23%	25.64%	-45.66%
Earnings covarinace across marital status	-5.00%	0.87%	-389.44%	-93.63%	-14.78%	56.78%
Other Income						
Covariance of own earnings & other income	2.13%	4.75%	-169.58%	-0.63%	1.44%	3.31%
Total Percent	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

* Note that positive signs refer to changes in the direction of the overall change in the correlation and negative signs to changes in the opposite direction of the overall correlation. For example, because men's correlation declined over time and has a negative sign, a positive sign on the percentage contribution of a component to the change in the men's correlation would indicate that it served to reduce the correlation over time.

Table 3. Correlation decomposition of own earnings and total family income for white men, 1970 & 2000: alternative estimates

Alternative Estimates	Adjusted for Family Size			Estimated with 2000 Weights			Estimated with Potential Earnings*		
	1970	2000	% Change	1970	2000	% Change	1970	2000	% Change
Correlation of own earnings & family income									
All White Men, ages 25-54	0.8725	0.8438	-3.29	0.8102	0.8249	1.81	0.7326	0.7285	-0.56
Married, all	0.8381	0.8185	-2.34	0.8300	0.8107	-2.33	0.8108	0.8349	2.97
Married, wife works full time	0.8628	0.8379	-2.89	0.8315	0.8235	-0.96	0.7972	0.8300	4.11
Covariance components, % of total correlation and change in correlation, 1970-2000**:									
	% of Total Correlation	% of Change		% of Total Correlation	% of Change		% of Total Correlation	% of Change	
Variance of own earnings									
Married, wife works full time	14.27%	20.99%	-228.61%	26.89%	26.41%	-0.43%	14.25%	22.47%	-1764.08%
Married, wife works part time	13.89%	12.26%	72.71%	16.26%	18.69%	145.69%	16.37%	13.76%	580.89%
Married, wife not in paid work	35.63%	11.78%	898.79%	19.04%	19.52%	43.79%	37.95%	12.81%	5476.75%
Cohabitators	0.18%	3.41%	-116.72%	5.63%	3.47%	-110.29%	0.12%	2.71%	-558.15%
Never married	14.61%	24.51%	-343.68%	12.33%	7.66%	-238.12%	3.54%	7.34%	-818.17%
Separated, Divorced, Widowed	12.74%	18.97%	-212.58%	11.51%	7.24%	-217.21%	3.17%	6.60%	-739.18%
Homogamy									
Married, wife works full time & spouse	2.86%	5.40%	-89.03%	2.99%	5.50%	137.23%	4.46%	8.76%	-926.45%
Married, wife works part time & spouse	0.85%	1.07%	-6.95%	0.40%	1.29%	47.98%	4.91%	5.36%	-93.10%
Married, wife not in paid work & spouse	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.52%	5.12%	1179.13%
Cohabitators	0.02%	1.13%	-40.48%	0.20%	1.01%	43.37%	0.04%	0.94%	-196.14%
Marital Sorting									
Earnings variance across marital status	9.17%	4.84%	166.00%	7.61%	3.60%	-207.39%	0.23%	1.00%	-165.63%
Earnings covarinace across marital status	-4.22%	-5.32%	35.28%	-5.04%	0.87%	316.10%	-0.46%	4.17%	-1003.51%
Other Income									
Covariance of own earnings & other income	0.01%	0.97%	-34.74%	2.18%	4.75%	139.29%	4.91%	8.97%	-872.37%
Total Percent	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

* Estimated for women in married couples, spouses present. Both spouses' data are adjusted accordingly. ** Note that positive signs refer to changes in the direction of the overall change in the correlation and negative signs to changes in the opposite direction of the overall correlation. For example, a positive sign on the percentage contribution of a component to the change in the men's correlation (if the change over time is negative) would indicate that it served to reduce the correlation over time.

Table 4. Correlation decomposition of own earnings and total family income for white women, 1970 & 2000: alternative estimates

Alternative Estimates	Adjusted for Family Size			Estimated with 2000 Weights			Estimated with Potential Earnings*		
	1970	2000	% Change	1970	2000	% Change	1970	2000	% Change
Correlation of own earnings & family income									
All White Women, ages 25-54	0.4222	0.6036	42.97	0.3228	0.5219	61.68	0.4641	0.5388	16.09
Married, all	0.4932	0.6445	30.68	0.3694	0.5803	57.09	0.6066	0.7243	19.40
Married, works full time	0.6831	0.7361	7.76	0.5864	0.7029	19.87	0.6652	0.7184	8.00
Covariance components, % of total correlation and change in correlation, 1970-2000**:									
	% of Total Correlation		% of Change	% of Total Correlation		% of Change	% of Total Correlation		% of Change
Variance of own earnings									
Married, wife works full time	16.22%	22.16%	35.92%	28.38%	31.55%	34.53%	11.40%	19.49%	69.75%
Married, wife works part time	6.13%	4.91%	2.09%	7.25%	8.43%	9.73%	10.75%	10.19%	6.70%
Married, wife not in paid work	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20.08%	8.61%	-62.63%
Cohabitators	0.15%	4.09%	13.23%	5.80%	4.70%	2.76%	0.06%	2.51%	17.68%
Never married	17.44%	24.62%	41.27%	17.66%	10.82%	-0.26%	2.87%	6.25%	27.25%
Separated, Divorced, Widowed	29.59%	26.27%	18.58%	22.95%	15.61%	3.50%	6.06%	8.14%	21.04%
Homogamy									
Married, wife works full time & spouse	9.01%	9.92%	12.02%	9.91%	11.70%	13.75%	10.57%	15.68%	47.44%
Married, wife works part time & spouse	2.69%	1.97%	0.28%	1.34%	2.75%	4.75%	11.64%	9.60%	-3.08%
Married, wife not in paid work & spouse	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	24.95%	9.16%	-88.88%
Cohabitators	0.05%	2.08%	6.80%	0.67%	2.14%	4.28%	0.09%	1.69%	11.64%
Marital Sorting									
Earnings variance across marital status	76.27%	27.18%	-86.56%	85.60%	25.64%	-67.35%	0.93%	1.16%	2.58%
Earnings covarinace across marital status	-55.64%	-22.09%	55.66%	-79.17%	-14.78%	90.22%	-1.03%	1.78%	19.23%
Other Income									
Covariance of own earnings & other income	-1.91%	-1.12%	0.70%	-0.38%	1.44%	4.12%	1.64%	5.75%	31.29%
Total Percent	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

* Estimated for women in married couples, spouses present. Both spouses' data are adjusted accordingly. ** Note that positive signs refer to changes in the direction of the overall change in the correlation and negative signs to changes in the opposite direction of the overall correlation. For example, a positive sign on the percentage contribution of a component to the change in the women's correlation, which increased over time, would indicate that it served to increase the correlation over time.

Table 5. Gender inequality measured as the ratio of correlations, whites, 1970-2000

	1970	1980	1990	2000
Married Men and Women Only				
Correlation between wife's earnings and combined earnings of wife and husband	0.3913	0.4469	0.5828	0.6143
Correlation between husband's earnings and combined earnings of wife and husband	0.8858	0.8792	0.8538	0.8433
Ratio of women's/men's correlation	0.4417	0.5083	0.6826	0.7284
Wife's earnings as share of combined earnings of wife and husband	0.1456	0.2089	0.2770	0.3083
All Men and Women				
Correlation between own earnings and total family income, women	0.2485	0.2814	0.4543	0.5221
Correlation between own earnings and total family income, men	0.8404	0.8331	0.8296	0.8254
Ratio of women's/men's correlation	0.2957	0.3378	0.5476	0.6325
Correlation between own earnings and total family income, adjusted for family size, women	0.4222	0.4366	0.5648	0.6036
Correlation between own earnings and total family income, adjusted for family size, men	0.8725	0.8651	0.8527	0.8438
Ratio of women's/men's correlation	0.4839	0.5047	0.6624	0.7153

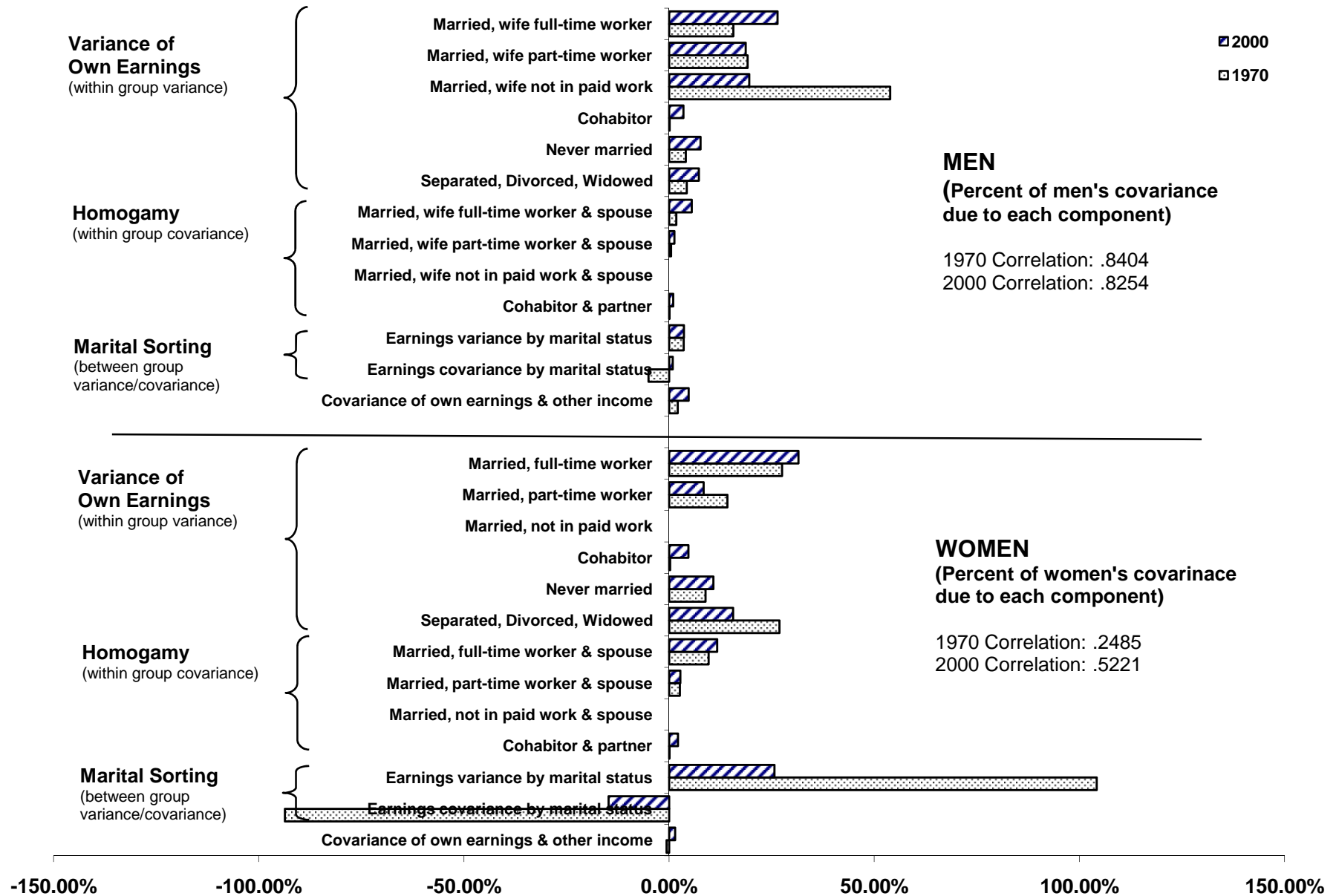


Figure 1. Covariance decomposition of own earnings and total family income by sex, 1970 and 2000