Modeling the Economic Dynamics of Divorce

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1 Introduction

When two people form a family, each can (or can choose not to) specialize in different types of labor, whether it be earning cash income, caring for children, doing home repairs, preparing meals or other household tasks . Two people can also benefit from economies of scale. By sharing a home, for example, their per person housing and utilities costs are significantly lower. Further, necessities like refrigerators, washing machines, and a car can be more efficiently shared if two people are sharing a home. The flip side of these economic benefits of marriage is that there can be large and potentially severe economic consequences of divorce.

Upon divorce, the economic gains of marriage are reversed, and it is inevitable that at least one partner initially ends up in a worse economic position. Family income that is contributed to and spent by two people during marriage is split, with each spouse experiencing both a reduction in income and a reduction in economic needs. If both family income and post-divorce economic needs were evenly split (i.e.,

when a childless couple with similar labor income divorces) the reduction in income would be larger than the reduction in economic needs because of the loss of economies of scale. Two people who shared one home, one heating bill, one wifi network, and one set of household chores, would have to pay for separate homes, separate heating bills, and separate wifi networks, in addition to the fact that each person would have to take care of the chores either personally or by "outsourcing."

Further, the specialization that can be Pareto optimal in a marriage can make the consequences of divorce more severe. In a marriage, it can potentially be better for both partners and their children for one partner to specialize more in paid employment and for the other to specialize in child rearing. The problem with this upon divorce is that the partner who specializes in child rearing tends to keep custody of the children while losing access to the income of the partner who specializes in paid employment. In addition, the child rearing partner's earning potential may have suffered due to time spent out of the labor force. In other words, specializing in child rearing during marriage results in lower income and greater economic need upon divorce. These relative specializations, and the problems they pose upon divorce, can also be a result of cultural pressure for men and women to conform to traditional roles within the family, rather than utility maximization on the part of the married partners.

The difficulty a person faces in recovering their pre-divorce economic well-being is a function of three characteristics upon divorce: the fraction of household income contributed by each partner, the number of children and who retains custody, and the redistribution of post-divorce income through child support. While progressive tax

rates and government transfer programs may partially offset changes in one's household income and family size, recovering pre-divorce economic well-being requires an increase in personal income in many situations. Re-partnering post-divorce is another means to recover one's pre-divorce economic well-being.

While many previous studies have demonstrated empirically that there is a gender gap in the economic consequences of divorce, we derive the growth in personal income required for a person to recover from the economic shock of a divorce as a function of pre-divorce characteristics and custody assignment upon divorce. Our preliminary results demonstrate the long odds that women face in recovering their economic well-being—due to their greater likelihood, relative to men, of earning lower income and retaining custody of the couple's children–in terms of the growth in personal income necessary to achieve it. For most women who retain custody of their children and do not re-partner, a decline in economic well-being is inevitable, possibly a dramatic one.

2 Defining Economic Well-Being

Families of different sizes have different levels of economic need. A single person with no children earning $50,000 per year has a far higher level of economic well-being than a family of five with the same income. For this reason, we define a size-adjusted income based on an equivalence scale following Buhmann et al. (1988):

$$\text{Adjusted Income} = \frac{\text{Income}_{\text{Post-Gov}}}{\sqrt{\text{Household Size}}}$$

Adjusted Income assumes economies of scale in household consumption by using the square root of household size as an equivalence scale. Reducing household size from two people to one person does not cut assumed economic needs in half, but instead reduces it by a smaller amount. This assumption is appropriate when a significant portion of household expenses are for resources that can be efficiently shared, such as housing and kitchen appliances, rather than items that are consumed individually such as prepared food or clothes.

We define economic well-being in the following way:

$$EWB = \log\left(\text{Adjusted Income}\right)$$

This definition of economic well-being assumes a logarithmic utility function, meaning that change in economic well-being is determined by percentage drop in income, rather than absolute drop: a \$10,000 loss in household income upon divorce for a person with a family income of \$30,000 pre-divorce produces a drop in economic well-being equivalent to a \$100,000 reduction in household income upon divorce for a person with a family income of \$300,000 pre-divorce. This assumption is appropriate if one believes that the marginal utility of income decreases with each additional unit of family income.

The economic consequences of divorce for an individual will be the difference between their economic well-being pre-divorce while married, and their observed economic well-being two years later when they are divorced:

$$\Delta EWB = \log\left(\text{Adjusted Income}_{\text{Post-Divorce}}\right) - \log\left(\text{Adjusted Income}_{\text{Pre-Divorce}}\right) \quad (1)$$

Divorces in which both partners experience an equally reduced economic position post-divorce are not typical. What occurs much more frequently is that women experience a sharp reduction in economic well-being, while men experience a more moderate one or perhaps an increase in economic well-being. This pattern was first observed by demographers such as Hoffman (1977) and Duncan and Hoffman (1985) in the aftermath of a sharp spike in the divorce rate. Subsequent studies of the economic consequences of divorce by gender include Peterson (1996) and Smock et al. (1999), who find that women do significantly worse than men to varying degrees. Burkhauser et al. (1991) compares the economic fate of divorcing women in the United States and West Germany, and finds that they fare approximately equally poorly in both countries.

All of the studies cited above used data from the 1970s and 1980s, but demographic trends in the intervening years might suggest the economic penalty of divorce for women might have significantly declined. Women's wage rates and labor force participation have risen and the burden of post-divorce child-rearing has diminished for women and slightly increased for men. The reason for this is twofold: divorcing couples have fewer children on average than they used to and men are more likely than before to have custody. Based on those trends, one might expect the economic consequences of divorce to have become significantly less severe for women and potentially worse for men, but a more recent study (Tach and Eads, 2015) finds that

the economic consequences of divorce appear to have slightly diminished, but still mostly persisted through the 2000s.

By decomposing the mechanics of change in economic well-being upon divorce, we seek to explain why women continue to face long odds in recovering their economic well-being post-divorce, despite the tailwinds from recent demographic and economic trends.

3 Decomposition of Change in Economic Well-Being

Let I_{t-2} be the total household income prior to divorce and I^o_{t-2} be an individual's own income, their personal contribution to household income. We then define p, the fraction of pre-divorce household income and individual contributed to be:

$$p = \frac{I^o_{t-2}}{I_{t-2}}$$

We define ΔI_o as the change in a person's own income from pre-divorce to some point in time post-divorce, HH_{t-2} as the household size pre-divorce, c as the number of children a parent has custody over post-divorce, and c_{t-2} as the number of children pre-divorce.

If, for the time being, we assume no re-partnering, we can decompose equation 1 into the terms we defined above.

$$\Delta EWB = \log\left(\frac{I^o_{t-2} + \Delta I_o}{\sqrt{HH_{t-2} - 1 - (c_{t-2} - c)}}\right) - \log\left(\frac{I_{t-2}}{\sqrt{HH_{t-2}}}\right)$$

Therefore the condition for a full-recovery of economic well-being ($\Delta EWB \geq 0$) is the following:

$$\begin{aligned}
\frac{I^o_{t-2} + \Delta I_o}{\sqrt{HH_{t-2} - 1 - (c_{t-2} - c)}} &\geq \frac{I_{t-2}}{\sqrt{HH_{t-2}}} \\
\frac{I^o_{t-2} + \Delta I_o}{\underbrace{I_{t-2}}_{I^o_{t-2}/p}} &\geq \sqrt{\frac{HH_{t-2} - 1 - (c_{t-2} - c)}{HH_{t-2}}} \\
\frac{p(I^o_{t-2} + \Delta I_o)}{I^o_{t-2}} &\geq \sqrt{\frac{HH_{t-2} - 1 - (c_{t-2} - c)}{HH_{t-2}}} \\
1 + \frac{\Delta I_o}{I^o_{t-2}} &\geq \frac{\sqrt{(HH_{t-2} - (c_{t-2} - c) - 1)/HH_{t-2}}}{p} \\
\text{Growth in own income} &\geq \frac{\sqrt{(HH_{t-2} - (c_{t-2} - c) - 1)/HH_{t-2}}}{p} - 1 \qquad (2)
\end{aligned}$$

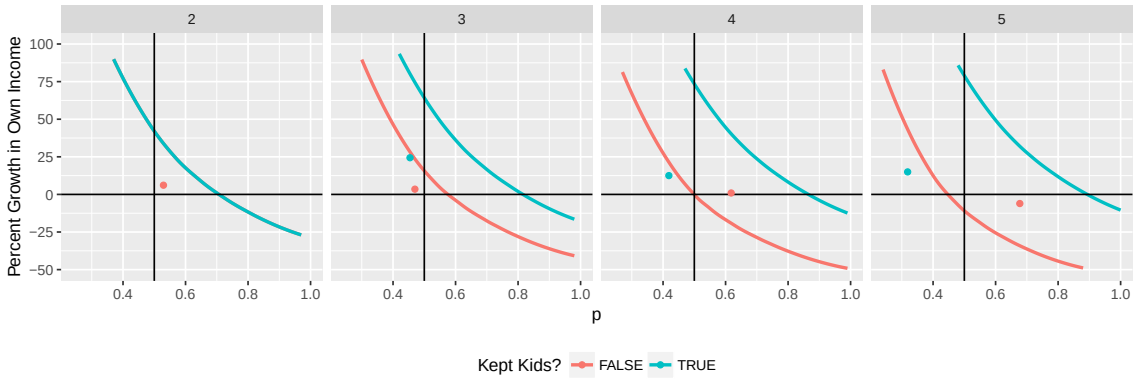
Through equation 2, we are able to express the growth in personal income required to maintain one's economic well-being post-divorce in terms of fraction of pre-divorce income and change in household size.

4 Analysis

Figure 1 summarizes the relationship between, p, growth in personal income, pre-divorce household size, custody assignment, and the likelihood of maintaining one's

economic well-being upon divorce. The curves illustrate the "break even" points by

Figure 1: Growth in Income Required to "Break Even" Upon Divorce by Pre-Divorce Household Size



p, income growth, and pre-divorce household size. Clearly, the break even point is very different depending on whether a person retained custody of children or not, and the size of the difference depends on pre-divorce household size. For three-person households pre-divorce, there is only one child, so the difference is smaller; for a household with five people pre-divorce, the difference between retaining and not retaining custody is much larger. Each point on the graph reflects the median value of p and income growth for divorcing people with a given household size who are or are not retaining custody of children post-divorce. We calculated the medians using the sample of divorcing people in the Panel Study of Income Dynamics (PSID) since the year 2000.

The figure illustrates a few dynamics that make recovering pre-divorce economic well-being difficult for people who retain custody of children. Even if one does not have any children, a person earning less than 50 percent of pre-divorce household

income requires a very large increase in personal income to recover their prior economic position. For people who retain custody, this simply becomes more and more extreme as family size grows. Further, as family size grows, the median value p observed for people who retain custody declines. The consequence is that for most people who do not retain custody of children, recovering their prior economic position upon divorce, or in fact substantially improving upon it, requires no growth in personal income whatsoever. For most people who retain custody of children, the growth in personal income required to maintain their economic position is so large in percentage terms that it is simply unrealistic.

Even if married women's wage rates and labor force participation rates converge with men's eventually, divorcing women will most likely continue to experience a reduction in economic well-being as long they are more likely to retain custody of children than men.

5 Further Refinements

The decomposition above, by definition, makes explicit the components of economic well-being before and after divorce, and thus enhances our understanding of the dynamics of the economic consequences of divorce. It does not, however, include the impact of changing eligibility for government transfers, progressive taxation, child support payments, and the economic impact of re-partnering.

We can incorporate each of these elements into the model, and we look forward to discovering the extent to which it will change our conclusion that the vast majority of

divorcing parents who retain custody will not be able to recover their prior economic well-being through personal income growth.

5.1 Government Transfers and Taxation

Using data from the Panel Study of Dynamics, we can model the relationship between growth in personal pre-tax income and growth in personal post-tax and transfer income, as a function of household size and income level.

5.2 Child Support

Both the Panel Study of Income Dynamics (PSID) and the Survey of Income and Program Participation (SIPP), provide information on child support payments. Using these data, we can estimate a model to generate predictions of child support payments by divorcing couple. In our PSID data, 38 percent of the individuals in the sample who retained custody of at least one child received child support, and the median annual amount of child support was $3,416.

We plan to estimate a model of child support using a hurdle regression model with two components:

1. A logistic regression that estimates the likelihood of receiving child support, conditional on pre-divorce family characteristics and custody assignment post-divorce.

$$Pr(\text{Receive Child Support} = 1|p, I_{t-2}) = f(p, I_{t-2})$$

2. A regression left-censored at 0 (limited to values above zero), which estimates

the amount of child support received post-divorce conditional on pre-divorce incomes of both partners and number of children.

$$E\left[\text{Child Support Amount}|\text{Receive child support} = 1, p, I_{t-2}, c\right] = f(p, I_{t-2}, c)$$

Together, these two regressions allow to us generate expectations of the likelihood and amount of child support different divorcing adults receive. We can then modify equation (2) to take into account the expected impact of child support.

$$\frac{\Delta I_o + E[\text{Child Support}|I_{t-2}, c, p]}{I^o_{t-2}} \geq \frac{\sqrt{(HH_{t-2} - (c_{t-2} - c) - 1)/HH_{t-2}}}{p} - 1 \quad (3)$$

Equation 3 shows that expected child support as a percentage of pre-divorce household income can substitute one-for-one with percentage growth in personal income. So, for example, if a person needed to grow their income by 40 percent to recover pre-divorce economic well-being, but their expected child support were 15 percent of pre-divorce household income, then they would only be required to increase their personal income by 25 percent ($40 - 15 = 25$).

For a preliminary estimate of the two regressions used to estimate expected child support, see Table 1.

5.3 Re-Partnering

We plan to modify our model of the economic consequences of divorce to incorporate the probability of re-partnering and the impact on post-divorce household size and

Table 1: Hurdle Model of Child Support Amount

Dependent Variable: Child Support|Child Support > 0	
(Intercept)	8.11^{***}
	(0.00)
I_{t-2}	0.07^{***}
	(0.00)
p	-1.22^{***}
	(0.01)
c	0.19^{***}
	(0.00)
Dependent Variable: Received Child Support?	
(Intercept)	0.50
	(0.30)
I_{t-2}	-0.01
	(0.02)
p	-2.17^{***}
	(0.55)
AIC	262646.32
Log Likelihood	-131316.16
Num. obs.	165

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

income of introducing another adult, and potentially step-children, to the household. If we define a new partner's income as I_n and the number of children from prior relationships they have as ΔHH_k, then the condition for maintaining economic well-being becomes:

$$\frac{\Delta I_o + I_n}{I^o_{t-2}} \geq \frac{\sqrt{(HH_{t-2} - c + \Delta HH_k)/HH_{t-2}}}{p} - 1$$

5.4 Re-Defining Our Income Adjustment

Using the square root of family size has advantages in terms of tractability, but it may not be the most accurate reflection of the relationship between family size and economic needs. We can make economic needs a function of household size

$$\text{Economic Need} = (\text{Household size})^{\alpha} \tag{4}$$

and adjust α to different levels (aside from 1/2) and see how it affects our conclusions. We can also explore abandoning a parametric relationship between household size and economic need completely and using the poverty threshold instead. If we find that it does not affect our main conclusions substantially, we can justify using the more tractable equation (4).

References

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