The Divorce Revolution Perpetually Reduces U.S. Economic Growth: Divorce Removes a Fourth of Head-of-Household Productivity Growth

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Chart 1 Macro-Economic Growth Components

Derived from Bureau of Economic Analysis NIPA & U.S. Census data; http://marri.us/human-capital

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Introduction

All economists regardless of their school worship at the altar of growth. Keynes argues expected growth drives investment and hence is key to economic prosperity and the full employment of the laboring population. Neo-classical economists, of the conservative “Chicago school,” emphasize the importance of growth. Growth increases the common pool of product, hence the wealth of a nation. However, finding causal agents (contributing factors) for growth has proved to be a difficult task, thus the lack to date of clear, causality-based policy actions.

1 As does the entire financial sector. Finance facilitates growth and entry into (expanding) markets and derives its income from performing this service—matching financing with capital needs.
2 This must then be realized, lest capital mis-allocation occur and a correction [capital market failure/crash] result.
3 John Maynard Keynes, The General Theory Of Employment Interest And Money (Kessinger, 1936). In his development of the multiplier and subsequent policy, Keynes confuses exogenous factors with endogenous ones (effecting growth).
4 “Rates of growth of real per capita GDP are diverse, even over sustained periods... Is there some action a government of India can take that would lead the Indian economy to grow like Indonesia’s? If so, what exactly? The consequences for human welfare involved in questions like this are simply staggering: Once one starts to think about them, it is hard to think about anything else.” Nobel Prize recipient Robert Lucas, “On the Mechanics of Economic Development,” in Marshall Lecture (1985). See also Gary Becker, Immediate and Medium Term Debt and Deficit Problems (2011), URL: www.becker-posner-blog.com. For more details see Footnotes 1 and 2 in http://marri.us/fiscal.
7 An important and generally agreed-upon agent for growth is population, as having more workers produce has the immediate effect of more product. See http://marri.us/human-capital and http://marri.us/fiscal on the importance of this factor for U.S. economic growth; Keynes, see n. 3, and Robert Barro and Xavier Sala-i-Martin, Economic Growth, Second Edition (Cambridge: MIT Press, 2003) for the argument more generally; and the addendum in Gary Becker, Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, Third Ed. (Chicago: University of Chicago Press, 1994), Pt. 3, Ch. 11, for an interesting additional argument.
8 Physical capital development is not an agreed-upon agent for growth, Barro and Sala-i-Martin, see n. 7, especially §10.4.6.
Summary of Findings

Marriage is a causal agent of economic growth. It constitutes one third to one fourth of the human capital contribution of household heads to macro-economic growth (Chart 1). The total contribution of human capital to growth of domestic product in turn is large, being of equal proportion to the other two contributing factors: size of the labor pool and physical capital (see again Chart 1).

Divorce removes this agent of economic growth.

Structure of the Paper

• Economic growth overview
  – The importance of growth
  – Growth components
    * Human capital ⊂ Marriage Effect
    * Population
    * Physical capital

• Demographics and divorce
  – The divorce revolution, a natural experiment
  – The U.S. population’s states in life: single, married, divorced

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9There are many reasons for the reporting uncertainty here, e.g. the wage stagnation that occurred in the 1970s (Chart 6) and also the lower growth in wages for workers later in their working life, a well-understood human capital effect—see http://marri.us/human-capital and Becker, Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, see n. 7. What is not uncertain in this reporting is the increase in productivity from marriage. Its effect is stable across the wage stagnation of the 1970s, cf. Charts 4 and 6. That is, it is robust across macroeconomic evolutions over the decades. Also, as we employ census 1% samples, there is little statistical/systematic uncertainty in the deduced parameters. (E.g. the t values testing the equality of what are usually notoriously badly diffused [difference-in-difference] statistics—the different income growths [of Charts 4 and 6]—are over 10, with essentially infinite sample sizes [in the $\chi^2_{n \to \infty}$ sense].) This fact is used in the development to follow by speaking of the parameters as if they are statistically certain.


11See http://marri.us/human-capital and references therein for proofs of these statements.
• Productivity accounting
  – Pre-divorce productivity
  – Post-divorce productivity
  – Divorce’s causal effect on productivity

It is worth emphasizing that though economic production generally, and growth particularly involve three components, economic enterprise is a human activity.\textsuperscript{12} Human beings, by the measure of growth accounting, contribute over half of what is valuable to production (Chart 1).\textsuperscript{13} Only one third of growth may be attributed to non-human, physical capital. Domestic production is affected massively by the human component’s contribution.\textsuperscript{14}

In the following sections, we investigate the effect of divorce on that human contribution to production, in particular how that contribution to production changed as more and more divorces affected heads of households during the 1960s and 1970s.

\textsuperscript{12}Hence Alfred Marshall’s proclamation, “…from every point of view man is the centre of the problem of production as well as that of consumption;” Alfred Marshall, Principles of Economics, Eighth Ed., Book IV Ch. 1 (Macmillan and Co., 1920).

\textsuperscript{13}Barro and Sala-i-Martin, see n. 7. The argument, simply, is that labor markets clear: it is always in firms’ interest to increase wages until the value of the extra bit of work gained by those wages—\textit{as contributed to production}—balances with that additional wage cost. See the following sentence and its footnote reference for proof.

\textsuperscript{14}See \url{http://marri.us/human-capital} and references therein.
Divorce’s Causal Effect on Productivity

**Chart 2** Percent of First Marriages that will Dissolve over the Decade, by Divorcé Age Group

*Derived from U.S. Census Long Form and CDC data.*

As seen in Chart 2, a revolution occurred in marital practice in the United States. Over the course of the 1960s and 1970s, the fraction of marriages that would eventually dissolve tripled for 30–year-olds and quadrupled for 40–year-olds and 50–year-olds. The rate of divorce has remained roughly constant since then, though marriage has become less frequent.\(^\text{15}\)

**Divorce Flowing Through the Population**

Chart 3 shows the effect of the increased divorce rates portrayed in Chart 2 on the population. The population of single men (bottom, orange area) is approximately proportional to population size, as marriage rates had not yet plummeted during the graphed period. The intact married population of

\(^{15}\)Later marital years are marked by increased marital stability—see Sally Clarke, *Advance Report of Final Divorce Statistics, 1989 and 1990*, vol. 43, supplement, techreport (CDC, 1995), and Chart 2 itself. The baby-boom, in which a population concentration exists, have entered their later marital years. The raw (total population) divorce rates promulgated by the media have nominally declined as this population concentration moves into these years of increasing marital stability.
men (center, blue area) increasingly transitions into the divorced population of men (top, red area) as time goes on and the divorce revolution affects the U.S. population. Holding divorces to their 1950s transition rates (cf. Chart 2) allows us to differentiate two populations: those men who would (still) be divorced under the old regime (red area above the black line) and those who experience divorce under the new regime (red area below the black line).\textsuperscript{16}


\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart4}
\end{figure}

We establish the causal effect of divorce for those men who experienced divorce because of the divorce revolution. For this group of “new” divorcés,\textsuperscript{16} Chart 3 is an idealization of population components’ change given by a model. Chart 4 is age-group focussed. This depiction captures part of the age-group effect of Chart 2. See the following subsection for the model’s description.
the rate of income increase, a measure of productivity growth,\textsuperscript{17} changes. Their rate of productivity growth decreases to nearly that of single, never-married men (Chart 4).\textsuperscript{18,19} Since divorce was relatively uncommon in the 1950s, and because around half of marriages end in divorce now (Chart 2),\textsuperscript{20,21,22} it can be said that it is this “average man” whose productivity is causally affected by the divorce revolution.\textsuperscript{23}

**Income Growth and Marital Status**

We now examine income and productivity by state in life.\textsuperscript{24}

As workers move from the married state to the divorced state they bring their productivity in the marketplace with them. We know this productivity changes because we see the change in their income,\textsuperscript{25} which is the value the

\textsuperscript{17}This is true because labor markets clear, cf. Footnotes 13 and 26.

\textsuperscript{18}The relative rates of productivity growth shown in Chart 4 continue to hold when we investigate this effect within education classes.

\textsuperscript{19}The rates reported are mean rates of change of (top-coded) income distributions. Top-coding conveniently eliminates distortions of (a very small number of) high-earners’ earnings. These earnings would otherwise measure less human capital and more social capital and risk calculi determining those earners’ wages. The income distributions of divorced and also of single men are always stochastically dominated by the distribution of incomes for married men. Thus, these means correctly characterize comparisons of the whole distributions. Furthermore, exploration of these distributions shows the results of the paper to hold for different quantile classes of these populations.

\textsuperscript{20}To see this, simply multiply the probabilities of marriage survival across the ages given by Chart 2.

\textsuperscript{21}The reason the red Divorced population does not overtake half the blue Married population in Chart 3 is because there is a (large) mass of older, more stable marriages already extant in the evolving U.S. population; the divorce revolution numerically works less on these marriages. Also, it takes time for the divorces of Chart 2 to affect even newly entered marriages. These facts induce what is known as a lag-effect in the population dynamics, a phenomenon always present in such dynamical systems, and sometimes termed population momentum in the field of demographics.

\textsuperscript{22}This assertion and the calculation of Footnote 20 can be doubly substantiated by the happy fact that the Census 2010 American Community Survey again has the necessary statistics on divorce to compute the completed marriage fractions for 60-year-olds, i.e. for those men who were 20 years of age once the divorce revolution was inculturated (by 1970). For these 60-year-olds, 50\%\pm2\% of marriages remain intact, and for 50-year-olds 55\%\pm3\% of marriages remain intact. Employing Chart 2, one can see that the 50-year-olds are on track to repeat the 60-year-olds’ performance.

\textsuperscript{23}One must interpret “average” in this “local population group affected by the transition to divorce” sense.

\textsuperscript{24}That is, the differential sub-population productivity growth rates.

\textsuperscript{25}We use wage income, as we want to measure human capital. A pseudo-wage also exists in defined benefits plans, which we cannot measure from census long forms. The neglect of this pseudo-wage results in an underestimate of marriage productivity differentials, likely
market is putting on that potentially changed productivity.\textsuperscript{26}

The divorce revolution has a perpetual effect on the productivity of heads of (broken) households (Chart 4). In order to determine both the transitions of workers from singlehood, through marriage, and into now-common divorce, as well as the productivity effects (if any) of these transition, we developed a model. 1) This model quantitatively describes population flows between the sub-populations of single, intact married, and ever-divorced men that occurred between the decennial census. 2) The model also tracks the incomes of these men, properly accounting for incomes ported between sub-populations as these men transition to different sub-populations. That is, these men “brought their incomes with them” as they transitioned between states in life. In this way we are able to accurately depict the income dynamics of these groups, as marriage and divorce affect them.

Chart 5 shows married men earn substantially more than single men, and more than divorced men. This however may be due to a “selection effect”: Women may select higher earners as mates, although women may equally well select more exciting and risk-prone men. Similarly, men who innately have higher human capital may be more marriage-prone, although high human capital men may equally well choose exciting, risky women. This seems to be statistically a closed problem for the U.S.\textsuperscript{27} Entirely independent by a simple factor deducible from the differential (annualized) annuity contribution rates as a fraction of total compensation. This assumes firms act in good faith and actually expect to pay said annuity.

\textsuperscript{26}That married men do not simply receive special treatment follows from general GDP [that is, production] considerations: See the end of Footnote 33; workers, by the analysis of \url{http://marri.us/human-capital}, are remunerated consistently for their labor + human capital contribution to production. However, in the 1960s [and the 1970s, though there are complicating factors], this remuneration would have been \textit{too high} a fraction of growth if we did not in addition take into account the wage-rate [and human capital-accrual, \textit{a posteriori}] decrease occurring in the population of newly minted divorcés of that period. See the last paragraph of Footnote 33. To reiterate, after translating the observed decrease in wage increases of these new divorcés, into its component of GDP—that group’s contribution to Product—we recover the excellent \{growth accounting\} correspondence between human capital + population + physical capital growth and overall GDP growth exhibited in Charts 1 and 2 of \url{http://marri.us/human-capital}, now over a 70 year post-war period.

To summarize that development, we anchor individual productivity in overall (domestic) productivity and show wages correspond to that individual productivity. Now we do it for a considerably longer period of time.

\textsuperscript{27}Meta-regression still shows some marriage premium for U.S. males, while for other populations the selection effect plus the effect investigated in this paper—increased productivity growth for married men—essentially zeroes out any potential (instantaneous) marriage premium. It should be noted that different countries have different \{incultur-
of this interesting theory, the rate of change in earnings year over year are consistently higher for men in intact marriages than among single or ever-divorced men (see Charts 4 and 6). It is remarkable that these differences in these rates of change (the distance between the lines in Charts 4 and 6) are more consistently constant than income growth itself: Note how in Chart 6 workers over their 40s and 50s experience wage stagnation (zero income growth) from 1970 to 1980, while the differential productivity of marrieds relative to the other classes of men stays essentially constant.\textsuperscript{28}

Within this natural experiment, recall we have two groups of divorced men depicted in Chart 3: those that would have divorced anyway, and “new” divorcés, a product of the divorce revolution. If these new divorced men were from a “least productive sub-pool” within the sub-population of married men,\textsuperscript{29} the remaining (smaller group of) married men would exhibit an apparent productivity boost, as this “dross” of new divorced men would finally be removed from that sub-population of marrieds. There is no change in the distance between the wage-growth curves as the country evolves and the divorce revolution plays out (Chart 4, Chart 3).\textsuperscript{30} As this boost to the upper curve is not seen in the census data (no change in distance between

\textsuperscript{28}Though there was economic growth, cf. http://marri.us/human-capital Chart 2, so the “stagflation” of the 1970s was really a wage stagnation.

\textsuperscript{29}This in either sense of total wage or wage rate-of-change.

\textsuperscript{30}Even with the massive wage stagnation of the 1970s—Charts 4 & 6.
**Chart 6** Comparison of Productivity Gains for Single, Married, & Ever-Divorced Heads of Household across their 40s resp. 50s; before (1950-1960) and through (1960-1970, 1970-1980) the Divorce Revolution

*Derived from U.S. Census Long Form*

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Over Their 40s

![Graph showing income growth per year over their 40s](chart6_40s.png)

Over Their 50s

![Graph showing income growth per year over their 50s](chart6_50s.png)

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curves), this “dross” cannot exist. If the new divorced men maintained their old productivity growth, a “most productive sub-pool” within the sub-population of divorced men would be formed and the new (much larger) pool of divorced men would see a productivity boost. These newly minted divorcés would now be contributing a higher level of productivity to the divorced sub-population’s productivity. Again, there is no change in the distance between the macro-economically relevant wage-growth curves as the country evolves and the divorce revolution plays out. As this boost to the lower curve is not seen in the census data (no change in distance between curves), this more productive sub-pool cannot exist. Our argument is summarized in Chart 7.31

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31 The statistically improbable case where only an exactly balancing productivity class of men transfers from the married to divorced state (exactly balancing productivity in the sense that their productivity is just that much higher than those otherwise divorced to move the lower curve up by the same amount the dross-clearing moves the upper curve up) may be rejected as the curves in Charts 4, 6 move down during this period, both absolutely and more importantly relative to the Singles sub-population—an “independent third baseline.” This is further contradicted by the fact that the divorce revolution occurred over two decades. Hence we have two periods wherein divorce affects two different populations. These populations differ generationally, and may be situated in different macro-economic environments. They did enter into marriage at different rates, for different ages. Thus, as the divorce revolution works its way through the population, divorce affects different types of divorced men. That is, if there were exactly balancing productivity “dross” transferred in the 1960s, this unlikely event occurs again in the 1970s with a new, even larger set of just-divorced men. This would mean divorce probability exactly determines human capital growth, i.e. that there is a one-to-one correspondence (across
Pre-divorce, divorced men are not less productive than other married men. Post-divorce, these new divorcés are not more productive than those whose class they are entering. Divorced men become less productive through divorce (Chart 8, Chart 9).32
Chart 8  The Effect of Divorce on the United States: Redistribution of Populations into Lower Growth Classes
Derived from U.S. Census Long Form

Chart 9  Determining the Effect of Divorce on the United States: Population Change & Differential Productivity
Derived from U.S. Census Long Form

Counts of Household Heads

Productivity Growth
Conclusion

The divorce revolution has undermined growth in the U.S. economy.\footnote{This result follows from this analysis and the fact that there was no population effect (see Footnote 7; this is perhaps the most \textit{basic} labor effect on economic production) from the 'release' of divorcées to the workforce across the 1970s and 1980s. This is easily demonstrated (this fact was earlier reported by Nobel Laureate Gary Becker in Gary Becker, \textit{A Treatise on the Family} (Cambridge: Harvard University Press, 1981), and we assert is strongly tied to the Solow growth paradox through [total] household productivity considerations). In \url{http://marri.us/human-capital} compare the (pure) population + human capital contribution to growth (Chart 1) to actual macro-economic growth (Chart 2). Women entered the workforce predominantly in the 1970s and 1980s. Actual growth (Chart 1) \textit{began to slow} during this period, even though the population effect of women entering the workforce alone should contribute more than 0.2\% per year. Clearly this is not seen. In fact, the population + human capital contribution chart (Chart 1) in the (over-) simplicity of its model over-estimates growth by the factor this paper elucidates. The corrected model, which looks much more like the actual 1960s-1970s growth profile, has a flat-lining of economic growth in the 1970s, instead of a hump around 1970 which the naïve population-based model shows.} As this analysis proves, marriage is a stable, assured causal agent of economic growth. Since marriage has this “remarkably large”\footnote{Akerlof, see n. 10.} accruing effect on a worker’s productivity, divorce eliminates this agent for growth.

The divorce revolution more than tripled the rate of divorce for the most important agent for economic growth and labor market activity: the working head-of-household. Divorce reduced that head’s productivity increases by one fourth to one third. Divorce, having become acculturated, perpetually inhibits growth of the U.S. economy.\footnote{See again Footnote 32.}

Besides for population effects originating in the 1960s and 1970s, there are no other consequences of policy change that have had a greater effect in slowing economic growth than the divorce revolution.