

6. The changing sexual division of labour*

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Man may work from sun to sun, But woman's work is never done.
(Saying)

In the United States, considerable media attention has been focused on the possibility that, as employment continued to fall in the autumn of 2009, the proportion of non-farm payroll jobs held by women could exceed 50 per cent. If this reversal of male–female employment patterns occurs, it will be a transitory one. Women's employment has been less sensitive to the business cycle than men's, and the current recession has had a particularly devastating impact on male-dominated industries such as manufacturing and construction.¹ A female majority in the US workforce is unlikely, therefore, to survive an economic recovery but, all the same, a milestone in the gender division of labour in the market will have been reached. The economic lives of men and women are converging – more slowly in some countries than in others, but inexorably.

In almost all societies, from hunter-gatherer communities to post-industrial economies, task assignment is gender specialized. The early care and nourishment of children are always in the women's sphere, and there has been considerable controversy in the social sciences as to how much of the sexual division of labour is determined by reproductive biology rather than social or cultural processes. A number of economists have constructed models that show how sex differences, including initial maternal investments in children and differential fecundity, can interact with constraints in the market and the household to produce distinct economic roles for men and women. Though sexual biology is stable, changes in technology and the development of markets have altered the comparative advantage of men and women in ways that have dramatically changed their allocation of time. Historically, increases in the return to human capital have set in motion a number of endogenous and interconnected processes that have reduced gender specialization: increases in women's education, changes in fertility and marriage patterns, and the marketization of household production.

As economies develop and production shifts from agriculture to industry to services, the organization of work also changes and alters the relationship between men's work and women's work. Farming as a joint family enterprise gives way to the 'separate spheres' of home and work in industrialized economies and then to the dense markets and shrinking households of wealthy post-industrial societies. Households have become smaller and less stable, and this has hastened the movement of economic activity from the family system to the market. In turn, the shrinking economic role of the family has reinforced the erosion of traditional family structures and changed the selection of individuals into marriage and parenthood.

Falling fertility and the increasing market returns to brains rather than brawn have reduced the economic significance of biological differences between men and women. This development raises the question of whether the sexual division of labour, and the gender wage gap that emerges from it, can ever be completely eliminated. The attention of researchers in many fields has been focused on measuring cognitive/behavioural differences in the capabilities of the sexes that could prevent this from happening – Are boys handicapped in early learning? Are women too averse to competition? The findings to date are limited, and distinguishing innate differences from the consequences of early socialization is difficult, but new insights about gender differences are likely to emerge over the next few years.

With the movement of women's work out of the orbit of the family enterprise has also come a shift in property rights. The distribution of the returns to family production depends on family governance structures; control of market resources empowers the individual within the family, and increased employment has empowered women. Beyond increased gender equality in distribution both within and across families, the implications of this change in control for economic development are unclear. Many believe that women's empowerment should be good news for children and for the growth of human capital; in particular, evolutionary models suggest that females have a greater interest in making investments in their offspring than do males. Changes in the economic roles of men and women have been accompanied, however, by changes in family structure that separate many children from their biological fathers. This implies that the well-being of children and investments in the next generation will depend both on the resources that women control, and on the contributions that men continue to make to their progeny – either individually or through some collective process.

MEN'S WORK AND WOMEN'S WORK

How Much Work? The Path to Equality

It is a common belief that modern women, with their double burden of market work and household responsibilities, must work more hours than men do. Michael Burda and colleagues (2008) report that a small majority of surveyed economists (and a somewhat larger majority of sociologists) believe that American women work at least 5 per cent more than men, if home work is added to market work. They go on to examine recent time diary data from 27 countries, and find that per capita income is positively related to gender equality in total work hours (Figure 6.1) and that women work substantially more than men on average in the low- and middle-income countries in their sample. Women also work more than men in several European countries, including Italy, Slovenia and Spain. Burda et al. emphasize, however, what they call the 'iso-work' phenomenon: the gender difference in the sum of market and household work hours is small and insignificant in rich, non-Catholic countries, including the United States. In most high-income countries, the additional hours that men

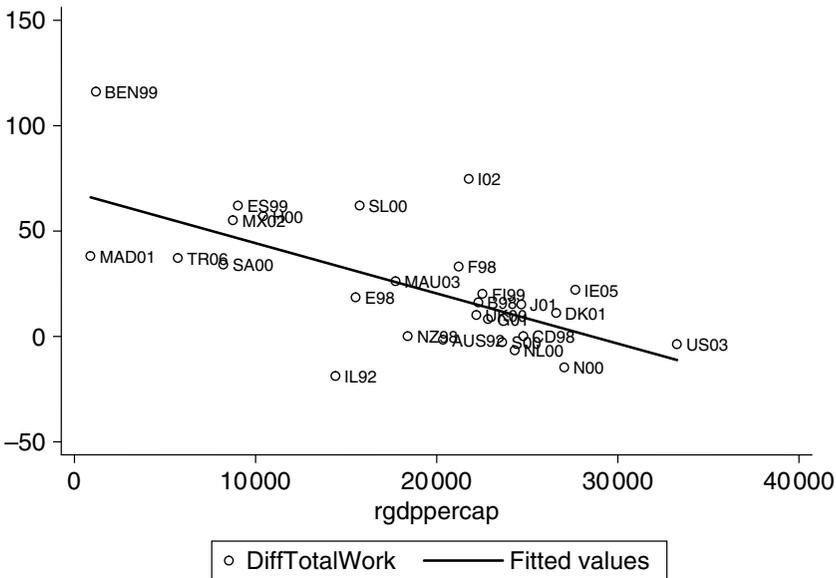


Figure 6.1 Female total work minus male total work compared to real GDP per capita, 27 countries (Fig. 2 in Burda et al., 2008)

supply to market jobs are completely offset on average by the excess work that women perform at home.²

Though historical data on time use is limited, it is tempting to conclude from this sort of cross-sectional evidence that economic development tends to promote gender equality in work effort. Time diary data from poor agricultural countries indicate that women work 20–40 per cent more hours than men on average,³ and Burda et al. find excess female work of 10 per cent or more in middle-income countries such as South Africa, Mexico and Turkey. Western European countries that do not conform to the ‘iso-work’ pattern are those that report more traditional attitudes to gender roles, and have maintained a more unequal division of domestic labour even as women’s education levels and labour force participation rates have risen. It seems reasonable to expect that one important dimension of the changing sexual division of labour in the coming decades will be decreasing hours of work for women throughout much of the world, towards equality with men’s hours.

Most of this trend towards equality will come from a decrease in women’s domestic labour. The gender realignment of domestic work in the USA and in Europe has been limited; women still provide most of the housework and childcare hours (twice as much care time and 56 per cent more time in ‘household activities’, according to the latest American Time Use Survey data).⁴ Noted less frequently is that the total amount of work being done at home has decreased sharply as fertility rates decline and home-produced goods and services are replaced by market-purchased substitutes. Since 1965, adult men’s non-market work in the United States has increased by nearly four hours per week, but women’s weekly hours have fallen by more than 12, more than offsetting a seven-hour increase in women’s market work.⁵

Looking at men’s and women’s work using standard data sources that are available over long periods of time and for a large sample of countries, work at home is essentially invisible, and the focus must be on measures of labour supply that reflect participation in market activities. Claudia Goldin has estimated a U-shaped relationship between women’s labour force participation and income, both over time in the United States (Goldin, 1990) and for a cross-section of countries (Goldin, 1995). She explains the initial decrease in women’s market work as incomes rise as a result of industrialization and the expansion of cities. The physical separation of home and work makes combining family care and remunerative labour infeasible, and leads to declining labour force participation by mothers. Figure 6.2 plots women’s labour force participation and per capita income for a large sample of countries in 2005, and a quadratic regression shows a distinct U-shape. Women in many poor African countries have high market

participation rates; in middle income countries – such as those in Latin America – women’s participation rates are lower than those in Europe, North America and Oceania.

The source of much of this variation in labour force participation, of course, is not how much women work, but where they work. The role of institutional changes as the formal sector of the labour market grows with economic development can be shown by disaggregating the workforce by sector. The proportion of the labour force that is accounted for by ‘family workers’ is decreasing in per capita income, while the prevalence of salaried workers is sharply increasing in income.⁶ Figure 6.2 also demonstrates the influence of political and cultural factors – communist countries such as China and Vietnam have more employed women than their income level would predict, and Muslim countries in the Middle East with many sequestered women drag down the centre of the ‘U’.

What Kind of Work? Comparative Advantage and Gender Task Segregation

In most societies, men and women do very different kinds of work. The care of young children (and most of the care of older children, the sick, and the elderly as well) is women’s work. Some activities requiring great physical strength are restricted to men, though women perform a great deal of strenuous physical labour, particularly in agriculture. In market employment, there is substantial occupational segregation, with women’s jobs often related in function and skill requirements to domestic work and offering lower pay than men’s jobs. The extent to which this division of labour is the outcome of biological differences between men and women, rather than of social organization and cultural constraints, has been a continuing subject of controversy in the social sciences. Economists have generally focused on the interaction between biological differences and market incentives as the source of sex-biased comparative advantage and the division of labour between men and women.

The economics of the household and of the sexual division of labour date from the late 1950s and early 1960s, and are firmly rooted in American family life in that period. In 1960, the labour force participation rate of women in the USA was less than 40 per cent – well down in the U of Figure 6.2 – and married couple families accounted for three-quarters of all households. In the ‘new home economics’ of the 1960s,⁷ the specialization of married men and women in market work and household production, respectively, was explained as an efficient allocation of family effort that maximized total output and family welfare. The fundamental basis of men’s comparative advantage in the market, and thus the sexual

division of labour, was the reproductive role of women. Gary Becker (1981) emphasizes women's 'heavy biological commitment to the production and feeding of children' (p. 37) because of lengthy periods of gestation and lactation. He argues that it is easier to combine the care of older children with the production of new ones than market activities. Over time, men become more productive in the market, and women become more productive at home, so that their divergent roles are further reinforced. With sector-specific investments in skills, a small initial difference in capabilities becomes a large productivity gap between men and women in equilibrium.

More recently, Aloysius Siow (1998) focuses on a different aspect of sexual biology – the fact that women are fecund for a shorter period of their lives than men – and its impact on labour market incentives. In a marriage market that allows for divorce and remarriage, women who are able to bear children are scarce, and older men have the opportunity to compete with younger men for them in the remarriage market. If their first marriage fails, men are more likely to remarry if their second period wage, which depends on their first period labour supply, is higher. Siow shows that young married men will work more in the market than young married women because of the option value of remarriage, which is not available to older (and non-fecund) women by assumption.

Economic approaches to occupational segregation by sex acknowledged differences in physical capabilities – women's manual dexterity, men's height and strength – but they too have emphasized the constraints imposed by maternity. Working mothers (or women who expect to be mothers) may choose employment that is compatible with childrearing and other domestic responsibilities. Expecting their labour force attachment to be relatively short and intermittent because of child-related withdrawals from employment, women will have an incentive to self-select into occupations that do not impose heavy penalties on such intermittency, that is occupations in which the depreciation rate of occupation-specific human capital is low.⁸ These job separations will also cause losses in firm-specific human capital and lead to a shorter work-life with a lower expected return to any investment in skills. This implies that women, and their employers, will invest less in their human capital, resulting in lower wages and lower returns to tenure. Women's concentration in occupations involving personal service or care was also considered to reflect their comparative advantage, in terms of both preferences and capabilities, in activities related to mothering.⁹

Of course, men and women are heterogeneous, and individuals of either sex may have skills and preferences that would predispose them to market or domestic tasks. If optimal specialization within marriage requires that

one spouse specialize in market work and the other in household production, and if sector-specific skill investments are made prior to marriage, a coordination problem arises. Individuals will be better off if they marry someone with complementary skills, but they do not know who they will marry, other than that it will be someone of the opposite sex.¹⁰ Early investments in sector-specific skills can, however, overwhelm these innate tendencies. Sex-specific early training can solve this problem, and investments in sector-specific skills can overwhelm within-gender heterogeneity in innate tendencies towards one sector or the other. Such training also provides a mechanism for the development of social norms and preferences that rationalize and support specialized roles for men and women. Such a social coordination mechanism can generate a sexual division of labour that is independent of biological differences – the assignment of genders to roles is arbitrary.¹¹ The structural functionalist approach to the family, exemplified by sociologist Talcott Parsons' characterization of the 'instrumental' roles played by men and the 'expressive' roles played by women, captures some aspects of these economic models of the family fairly well.

Anthropologists have reflected more broadly, both in space and time, on the sexual division of labour and possess an analytical framework that shares with economics an emphasis on the interaction of environment, production technology and human capital. This literature is instructive for economists: it provides an analysis of male–female production complementarities under different resource conditions, conceptual links between the division of labour in the nuclear family and the community, and an evolutionary context. Researchers have concluded that gender-based task segregation is nearly ubiquitous, but highly variable and contingent on resources and technology. Most pre-industrial societies distinguish between men's tasks and women's tasks, but there are many departures from the familiar men hunt–women gather dichotomy. In a classic study, Rhoda Halperin (1980) uses five case studies from subsistence foraging societies to show how the environment affects the allocation of tasks. In some societies, only men hunt; in others, both men and women hunt and fish but in many cases use different technologies to do so. Halperin emphasizes the production complementarities between men's and women's tasks and their mutual dependence in subsistence communities. Nevertheless, geographical and seasonal variation in the abundance of resources changes the extent and type of gender specialization, with scarcity associated with greater specialization in cooperative procurement.

Women's work in all societies includes the production of and early investments in children. Pregnancy and childcare responsibilities limit women's ability to participate in large game hunting in most (but not all)

hunter-gatherer societies. Douglas White and colleagues (1977) analyse the joint production processes that lie behind the varying sexual division of labour across societies: they assert that production economies arise from combining tasks that are adjacent in the production process and 'clusters based on physical location and temporal sequences of the tasks'; reproductive diseconomies arise from exposing adult females and infants to danger.

Two forces are seen in this literature as driving the development of extreme specialization in male and female activities. First, technological advances in the technology of food acquisition and processing required that individuals learn to perform more complex tasks. Gender segregation provides both a learning environment and a coordination mechanism for such skill acquisition. Second, the transition from hunter-gatherer to sedentism and the adoption of animal husbandry appears to change the extent to which women move independently and acquire resources. Patricia Draper (1975) studied the division of labour between men and women in two groups of !Kung – one a traditional hunter-gatherer group and the other sedentary at a permanent water source.¹² The first group is relatively egalitarian, with women travelling long distances to forage and contributing 60–80 per cent of the family's food. In the second group, the women are mostly homebound while the men travel and accumulate wealth by cultivating crops and accumulating stock.¹³

More recently, researchers in human behavioural ecology (a field of anthropology that takes an evolutionary approach to the study of economic and demographic behaviour) have applied contrasting optimizing models to explain the sexual division of labour. In many societies, men pursue high-variance foraging strategies, such as hunting large game, with the output of a successful hunt treated as a public good and shared widely across households. Women, in contrast, provide for children and close kin by gathering and hunting small, more predictable game. This pattern can be explained as the optimal foraging strategy of a couple with complementary skills. Women's tasks are more childcare compatible; the sharing of game among men creates reciprocal obligations within the community that have insurance benefits for the household, and the diversity of sources provides a nutrient-rich diet. Alternatively, men's hunting can be treated as a form of competitive signalling of male prowess that can yield private returns in social status or improved mating opportunities.¹⁴ In a study of foraging strategies in an Australian Aboriginal community, Rebecca Bliege Bird and Douglas Bird (2008) argue that Martu women hunt lizards to reliably feed their children and maintain cooperative relationships with other women, while men hunt kangaroo and 'trade off reliable consumption benefits to the hunter's family for more unpredictable benefits in

social standing for the individual hunter' (p. 655). Men hunt to impress potential in-laws, build their reputation as hunters, and make contributions to the collective good that help them rise in social status.

This signalling model of the household division of labour adds another dimension to the anthropological focus on the efficient allocation of human resources – sexual conflict based on the divergent reproductive interests of men and women. In general, men and women choose to invest resources in two alternative activities that contribute to reproductive fitness: providing for current children or acquiring additional ones. Parental certainty and limited fecundity push women to more intensive parenting investments in the children they have; men have more mating opportunities and pursue a strategy that emphasizes mating effort and the acquisition of more children. These differences imply a conflict of interest between men and women: their distinct foraging efforts reflect their inconsistent foraging goals. Michael Gurven and Kim Hill (2009) point out, however, that the sexual conflict implied by the 'hunting as signalling' model may be over-stated. Since family members can benefit indirectly from men's social status and the claims on group reciprocity that a good hunter acquires, the cooperative provisioning model may be robust as evidence that risky hunting yields signalling benefits.

The analysis of foraging strategies in hunter-gatherer societies shows that biology can be an important ingredient in explaining the sexual division of labour, but that the way biological incentives and constraints affect behaviour depends on the social and material environment. In modern economies, the sexual division of labour is determined in two arenas: the market and the family. The convergence in men's and women's economic lives over the past century – increases in women's market employment, a decreasing gender wage gap, and falling occupational segregation – has two principal drivers, demand and supply. Changes in production technology and capital accumulation have increased the relative demand for female labour, while demographic changes have reduced the domestic demands on women and increased their market labour supply.

TECHNOLOGY AND RELATIVE WAGES

The history of women's employment in industrialized economies has received considerable attention from economists, and the role of changing technology in increasing both the demand for and supply of female labour has been an important theme in that work. Technological advances that increased the relative productivity of women pulled them into market

jobs. In many countries, the introduction of manufacturing processes that increased the returns to worker manual dexterity have been accompanied by increases in the employment and relative wages of women and children. Goldin (1990) has documented the role of the new information technologies introduced in the early twentieth century in the increased demand for office and clerical workers – many of them female graduates of the new US high schools. On the home front, labour-saving innovations freed women from many hours of domestic drudgery. The electrification of households led to the development of new domestic appliances, such as washing machines and refrigerators, which substantially increased the productivity of women's time at home and reduced the opportunity cost of market work. The prices of major domestic appliances fell steadily as production volume rose, technology improved, and competition increased, but over the twentieth century investment in household appliances as a proportion of GDP tripled.¹⁵

More recently, increasing returns to education and rising inequality in the wage and earnings distributions of many countries have been interpreted as the consequence of skill-biased changes in production techniques, such as computerization. Though in general low-wage workers – such as those with low levels of education – have fared relatively poorly in recent decades, the gender wage gap has been declining. Francine Blau and Lawrence Kahn (1997) characterize the rising relative wages of American women during the 1980s as 'swimming upstream' despite changes in the wage structure unfavourable to low-wage workers. They find that women's pay rose because of relative improvements in their occupational distribution (and work experience) and a decrease in the 'unexplained' portion of the gender wage gap.

One explanation is that men and women, conditional on observed factors such as education and experience, bring different skill vectors to the market and that the demand structure for those skills is changing. Oded Galor and David Weil (1996) investigate the gender gap in a simple growth model with three factors of production – physical capital, physical labour and mental labour. Male and female workers have equal mental abilities, but only men supply physical labour. Capital is assumed to increase the marginal product of mental labour proportionately more than it raises the marginal product of physical labour, so that capital is more complementary with women's labour input than with men's. This implies that an increase in the amount of capital per worker increases the relative wages of women.

A more disaggregated approach to examining the role of changing returns to skills in reducing the gender wage gap has been taken by a number of recent empirical studies. These studies have used measures

of the specific tasks performed or skills required in jobs to estimate the returns to these skills, how they have changed over time, and what impact those changes have had on the wages of men and women. In general, they have found that changes in the returns to specific job skills in industrial countries have systematically benefited women. Marigee Bacolod and Bernardo Blum (2010) use the *Dictionary of Occupational Titles* (DOT) data linking worker skills to 12,000 occupational titles to estimate the wage returns to cognitive, motor, and 'people' skills and to physical strength in the US labour market between 1968 and 1990. They find that the returns to cognitive and people skills more than doubled during this period, and that these changing skill prices differentially benefited women. With job assignment and worker qualifications held constant, rising prices for cognitive and people skills explain about 20 per cent of the narrowing of the gender wage gap during the 1980s. The gender wage gap was also reduced by increases in the relative education and experience levels of female workers, and by changes in the job assignments of men and women. Bacolod and Blum show that, at all education levels, women moved more rapidly than men into cognitive skill-intensive and people skill-intensive jobs. Lex Borghans and colleagues (2006) also find that the returns to people ('soft') skills has increased in Germany and the UK, and that these price changes explain part of the rise in relative female wages in these countries as well.

Using worker self-reports of routine and non-routine tasks performed on the job, Sandra Black and Alexandra Spitz-Oener (2007) find that changes in task prices do not play a role in the narrowing of the gender gap in Germany between 1979 and 1999. Instead, they find that much of the relative improvement in women's wages during this period was accounted for by changes in the tasks performed, that much of this change occurred within occupations and industries, and that tasks changed most dramatically in association with computerization. Female workers experienced large relative increases in the non-routine interactive and analytical tasks they performed. Female workers also reported a substantial reduction in the performance of routine tasks, but male workers did not.

It seems reasonable to conclude that changes in production technology and in the structure of demand since 1980 have benefited female workers more than male workers. Women's jobs have been upgraded, both in terms of the skill requirements of the tasks performed, and in terms of the relative compensation for those skills. What these studies cannot answer is why this job reassignment has occurred – whether female workers have a comparative advantage in working with new technologies or whether pre-existing occupational barriers have been lifted.

DEMOGRAPHIC TRANSITIONS AND THE TRANSFORMATION OF WOMEN'S WORK

Increasing returns to female labour in the market have led to dramatic changes in domestic life. Children have become more expensive as the price of a primary input – mother's time – has increased, and births have been delayed to accommodate extended periods of education for women. In turn, falling fertility and the outsourcing of much household work have reduced the potential returns to marriage as a production-based (and gender-specialized) partnership. The surplus from modern marriage and cohabitation is increasingly based on consumption – of household public goods and companionship – and this has influenced marital stability and selection into marriage. Emerging patterns of marriage and fertility thus both reflect and help to determine the work that men and women do.

Fertility

The large declines in fertility that began in the late nineteenth century in Western Europe were preceded by decreases in mortality. Decreasing death rates, particularly declines in infant mortality, dramatically increased the reproductive productivity of women and drove rapid population growth during the early stages of the first demographic transition. Fertility declines, however, did not only offset the increasing probability of child survival. Birth rates continued to fall for more than 100 years, reducing the number of surviving children continuously through the twentieth century except for the brief interlude of the post-war baby boom. The implications of this large reduction in family size, which has now occurred in most parts of the world, are profound for the sexual division of labour. With increased expected life-spans from reduced maternal mortality and less time spent in pregnancy and lactation, women's time allocation is no longer sharply constrained by maternity. Of course, more time can be invested in each child in these smaller families, but some of that investment can also be delegated or outsourced.

Galor and Weil (1999) argue that the fundamental cause of the demographic transition was not a decrease in infant and child mortality (an outcome of the Agricultural Revolution that increased the food supply) or a rise in per capita income, but rather an acceleration in the rate of technological progress that increased the demand for human capital. An increase in the return to human capital as part of the second phase of the Industrial Revolution caused parents to reallocate their resources towards child quality and away from child quantity, triggering declining fertility across a set of countries with very different levels of income (England, Germany

and Finland). The increasing demand for human capital also increased the wage differential between adult (skilled) and child (unskilled) labour, and prompted support for educational reforms and for laws restricting child labour. In earlier work, Galor and Weil (1996) suggest a reinforcing mechanism that ties the demographic transition to technological progress and capital accumulation – the complementarity of capital with mental-intensive tasks, and therefore with female labour. Industrial development, as we have seen, increases the relative demand for women's labour, shrinks the gender wage gap, and also increases the cost of children.

The trade-off between women's childrearing time and market work is not always obvious in the cross-section. Suzanne Bianchi (2000) shows that maternal employment has remarkably little impact on mothers' time with children in the United States, and Jonathan Guryan and colleagues (2008) document a strong positive relationship between parental education and time with children in a sample of 14 countries, although more educated parents also spend more time at work. During the past couple of decades, what had been a negative correlation between fertility and women's labour force participation across European countries has become a positive correlation as women's market work has increased in all countries. Countries with very high rates of female employment, such as the Nordic countries and the United States, have been able to maintain (or even increase) fertility rates, while many countries with relatively low female participation, such as Italy, Greece and Japan, have experienced substantial drops in fertility to extremely low (sub-replacement) rates. Explanations for the low-fertility, low-market work outcome have included limited public support for working mothers and underdeveloped childcare markets (Del Boca and Vuri, 2007). Low marriage and fertility rates are also correlated, however, with survey reports of traditional gender norms and excess female work. Almudena Sevilla-Sanz (2005) suggests that, although efficient marital arrangements in these countries would involve a more egalitarian division of labour as women's wages rise, persistent social norms prevent a young couple from making a credible marital contract that supports that more equal division.

Marriage

One consequence of the marketization of domestic labour has been a decline in the returns to marriage and other co-residing family arrangements. Economies of scale in the production of household goods, once achieved in the kitchens and nurseries of large families, can be bested by canned soup factories and daycare centres. Many of the gains to specialization and exchange that were generated within households now

produce low-cost market goods. Household production complementarities between men and women have decreased in importance as sources of marital surplus, and the role of consumption complementarities, have necessarily increased. Joint consumption of household public goods and the enjoyment of leisure time together generate the returns to a modern companionate marriage.

This change in the sources of marital surplus has implications for how individuals choose among different family arrangements, and for patterns of assortative mating. The value of household production is maximized by marriages of men and women with very different capabilities and preferences for household tasks and market work – by negative assortative mating. Gains from the joint consumption of public goods, on the other hand, imply positive assortative mating on the preferences for these goods (Lam, 1988). The observed increase in the degree of positive assortative mating on education is consistent with a shift in the source of marital surplus from production to consumption (Schwartz and Mare, 2005).

New sources of data worldwide provide opportunities to examine marital sorting and marital homogamy on determinants of individual capability and preferences beyond education and religion. Although large longitudinal surveys in both developed and developing countries now collect data on a wide range of individual attributes, including preferences and psychological and physical characteristics, their role in family formation and their implications for the changing division of labour in households have been little studied. One piece of evidence comes from the German Socio-economic Panel Study, which in recent years has collected measures of personality and other psychological characteristics from a representative sample of the German population.

Personality traits may be reflective of both individual capabilities (and therefore inputs into household production) and individual preferences (including preferences for household public goods). Someone who is conscientious, for example, will both do a good job of coordinating the family's finances and prefer an orderly household environment, while someone who is highly open to experience will perform well at tasks that require creativity and be bored by a quiet, orderly family life. This implies that it matters, in predicting how personality types select into marriage, whether the gains from marriage come primarily from production complementarities or from the joint consumption of public goods. If specialization and exchange are important determinants of marital surplus, then we expect to see that different personality profiles will be associated with selection into marriage for men and women. If marital surplus is generated by the joint consumption of household public goods and the mutual enjoyment

of leisure activities, then we would expect to see that the same traits predict marital status for both men and women.

David Lam (1988) shows, in a model in which the gains from marriage depend only on a household public good and potential spouses vary only in wealth, that there will be positive assortative mating on wealth. In this case, there are returns from spouses having similar demands for the public good. Similarly, there will be returns from spouses having similar tastes *B* for public goods consumption, and we expect to see that individuals with stronger preferences for marital public goods are more likely to marry. On the other hand, if marital public goods are produced in the household and if men and women supply different inputs to that production process, then potential marital surplus and the probability of marriage will depend on different traits for men than for women.

If the sources of the gains to marriage are changing as women spend more time in market work, fertility rates fall, and gender specialization decreases, then this should be reflected in changing patterns of selection into marriage. Using longitudinal data to construct the marriage histories of several cohorts of German men and women, I find that the characteristics that predict marriage by age 35 and the probability of divorce by age 35 are indeed distinctly different for cohorts born between 1946 and 1959 and later cohorts born between 1960 and 1969 (Lundberg, 2009), and in ways that suggest a change from production- to consumption-based marriage.¹⁶

Among the older cohorts, the determinants of marriage are very different for men than for women: women who score high on the personality traits 'agreeableness' and 'neuroticism' are significantly more likely to marry than women who do not, and men who are 'antagonistic' (the converse of agreeable) and 'conscientious' are more likely to marry. Thus, women who are emotional and place a high value on harmonious relations select into marriage, as do men who possess personality characteristics that many studies have found to be predictive of labour market success. 'Agreeableness' also reduces the probability of divorce for women, as does 'conscientiousness' for men. These patterns are consistent with gender-specialized contributions to marital surplus, with men providing stable material support and women providing nurturance.

In contrast, the determinants of selection into marriage for younger cohorts¹⁷ are essentially identical for men and women – 'conscientiousness' increases the probability of marriage for both, and 'openness to experience' decreases the probability of marriage. These results are less consistent with specialization as a source of marital surplus, but rather with common preferences for marital public goods. Since 'conscientiousness' includes a willingness to comply with conventional norms, and low

'openness to experience' implies a low demand for variety and novelty, these selection patterns may provide a rather discouraging view of marriage and cohabitation in Germany, but the increase in gender homogeneity across cohorts is striking. These results strongly suggest that a gendered division of labour within families is no longer an important determinant of marriage patterns and that, in Germany, this change has occurred among recent cohorts.

HUMAN CAPITAL: WHAT'S WRONG WITH MEN? WHAT'S WRONG WITH WOMEN?

The convergence in wages, time use and patterns of selection into marriage between men and women in post-industrial, low-fertility economies suggests that the sexual division of labour may eventually disappear altogether. Other research in human development and behavioural economics, however, continues to document persistent differences in the abilities and behaviour of males and females that raise doubts about an economically gender-neutral future.

Women's levels of human capital have been catching up with men's around the globe, and in many countries the educational credentials of young cohorts of women exceed those of men. Women represent 54 per cent of new entrants to tertiary education in OECD countries.¹⁸ The post-war gender gap in college enrolments in the United States had disappeared by 1980, and nearly 60 per cent of current college students are women. A reduction in male advantage in educational attainments can be explained by women's rising expectations of future employment and lower fertility, but the widening gap in favour of women throughout much of the world requires some explanation, since neither wages nor employment rates have reached parity.

Claudia Goldin and colleagues (2006) argue that, once the barriers to women's educational access and job opportunities were reduced ('a more level and wider playing field for girls. . .'), women began to invest more in college education than men because their economic returns are higher and their effort costs of college preparation and completion are lower. They note that women's college wage premium is higher than men's, though a complete accounting of the returns to education would also include the returns from increased work hours and from lifetime gains in the marriage market. The risk of divorce and the need to provide continued support for children has increased women's demand for general human capital. Goldin et al. note that women have consistently outperformed men in secondary education in terms of both completion and achievement, and that many of

the factors contributing to that earlier success – lower rates of behavioural problems and learning disabilities and more homework – may provide the key to women’s relative success in higher education as well.

Differences in social and behavioural skills between boys and girls arise early and have a significant impact on gender differences in school performance. Thomas DiPrete and Jennifer Jennings (2009) find that an index of skills including self-control and interpersonal skills has a substantive impact on a range of academic outcomes from kindergarten to fifth grade, including reading and maths scores, teacher assessments and grade retention. Boys and girls receive approximately the same return to these skills, but girls enter school with more advanced skills, and their advantage grows over time. A debate persists as to whether these differences are a result of biologically determined maturation processes, cultural practices such as family socialization, or an interaction between the two, such as school environments that are poorly designed to meet the developmental needs of boys. The apparent male disadvantage in academic success and its source in social and behavioural factors may explain recent changes in the relative skill endowment of men’s and women’s jobs mentioned above, with women benefiting more from the rising returns to cognitive and people skills.

Women’s lack of success in highly demanding fields, such as the upper echelons of business (and the economics profession) has led to a search for more subtle sex differences in the laboratory. A substantial body of recent experimental evidence in both psychology and economics indicates systematic differences in the preferences of men and women that could contribute to sex segregation in economic activities.¹⁹ In choices among both real and hypothetical lotteries in a lab setting, women are more risk averse than men, and this is consistent with studies showing that women make more conservative decisions in allocating their own assets. Explanations for this difference include different emotional responses to outcomes (women are more likely to experience fear in the face of losses, while men are more likely to feel anger, and this affects their assessment of the riskiness of a gamble), a greater degree of men’s overconfidence of success in uncertain situations, and gender differences in the interpretation of a risky situation as a threat or a challenge. Women are more reluctant to enter a competition, such as a tournament or an auction, and in a competitive environment, men’s actual performance improves relative to women’s. Muriel Niederle and Lise Vesterlund (2007) allow men and women to choose between a tournament or a piece-rate compensation scheme for a task in which there is no gender difference in performance: most of the men choose the competition and most women choose the piece-rate system. The results of these studies indicate that the gender differences in compensation systems are

the consequence of both male overconfidence and actual preference for competition. Both laboratory studies and surveys show that women are less likely to initiate or to participate in a negotiation.

The question that underlies the recent prevalence and intense interest in these studies appears to be: Can the division of labour in modern societies ever be gender neutral? The inevitable discussion of the role of nature vs. nurture in producing differences in male and female competitiveness can call on a number of interesting studies. If women learn to avoid competitive situations, perhaps because they expect to be punished for assertive behaviour, then we would expect gender differences to develop as children age, and perhaps to vary across societies. William T. Harbaugh and colleagues (2002) find that gender differences in experimental play emerge during childhood, with younger children (between second and fifth grade) playing identically, but older boys and girls (ninth to twelfth grade) playing differently. Uri Gneezy et al. (2009) find that men in a patriarchal society (the Maasi in Tanzania) are twice as likely to choose to compete than women, while women in a matriarchal society (the Khasi in India) are more likely to choose competition than men, suggesting that social structure and culture are important determinants of individual experimental play. On the other hand, literature that links hormones such as testosterone and cortisol to aggression and competitive behaviour supports a biological origin for some part of the observed sexual differences in behaviour, even if they are accentuated by socialization. The jury is still out on the extent to which innate differences explain sex differences in experimental measures of risk aversion and competitiveness.

POWER, PROPERTY RIGHTS AND GROWTH

Given that the time use and market roles of men and women are rapidly becoming more equal in much of the world, what are the implications for long-term outcomes, such as economic growth? Apart from the implications of changing gender roles for population growth, the answer depends on differences in the allocation choices of men and women, and the way that decisions emerge from multi-agent households. Economic models of the family now include both cooperative and non-cooperative bargaining models, most focusing on the decisions of married couples.²⁰ In a standard cooperative model, the two players – husband and wife – agree on an allocation that depends on their individual preferences, their collective resources and their threat points. In marital bargaining, the threat point is usually specified as the best outcome for each spouse outside the 161 marriage – in other words, a divorce threat. Alternatively, the threat point

can be a non-cooperative outcome that does not end the marriage, though the deadlock is likely to be inefficient (Lundberg and Pollak, 1993). In either case, the partner with greater control over resources will have a more attractive fall-back position, more power in the marriage and the ability to get (closer to) what they want. These resources can be economic or social, but control over income is the standard metric of household power. The changing division of labour that moves women's work out of the family orbit and into the market can be expected to increase women's ability to affect the allocation of household resources, as can legal changes that increase women's control over their own income and property. The question then is: Will this change in control have any effect on the allocation of resources in the economy as a whole?

Variation in policies, institutions and labour market conditions that can alter the extra-marital options facing men and women, or the control of resources within the household, have been the subject of a number of empirical studies of intra-household distribution. In general, improvements in women's ability to control reproduction,²¹ acquire title to land,²² divorce and receive alimony payments,²³ and earn a living²⁴ have been shown to have positive effects on outcomes for women in partnerships, including fertility control, leisure and physical security. A World Bank report reviewed the literature and asserted that 'the evidence on determinants of intra-household resource allocation and investments makes a strong case for targeting interventions by gender – to promote gender equality and more effective development' (World Bank, 2001, p. 163).

Why should specialization in household production, rather than market work, necessarily reduce women's bargaining power within marriage? Both partners have contributed to the well-being of a joint household and invested in a set of productive skills, and the withdrawal of domestic services can provide an effective threat, as does the withdrawal of income. Home skills are not likely to support the same kind of threat point as market skills, however. One source of asymmetry lies in the degree to which market and domestic skills are valuable both inside and outside the marriage (Baker and Jacobsen, 2007). The return on investments in an individual's market earning power is not generally conditional on domestic arrangements,²⁵ while some part of domestic skill is likely to be marriage specific, and therefore of no value in single life or in subsequent relationships. To the extent that parents value biological children more than step-children, investments in children are also relationship specific.

Women's economic and political rights tend to increase with economic development and are strongly correlated with income per capita (Doepke and Tertilt, 2009). As recently as the early nineteenth century in the United States and England, women had no independent legal status

and were essentially the property of their husbands or fathers. Women ceded control of their property and earnings to husbands when they married, and had no right to enter into contracts without consent or to retain custody of their children in the event of divorce. Reforms beginning in mid-century in both countries granted significant property rights to married women before they attained the right to vote. For economists, the rapid and comprehensive empowerment of women is explained, not as the outcome of evolving cultural and political forces, but as a reflection of the changing self-interest of male voters. The centrepiece of economic models of women's liberation is the trade-off that men face between voting for the extension of rights that will augment the bargaining power of their own wives vs. increasing the bargaining power of the wives of other men – including their own daughters. A man would prefer to preserve patriarchal power in his own marriage, but cares about the well-being of his daughters and the success of his grandchildren. His daughters will benefit directly from reform (though sons will be harmed) and, if women invest more of the resources they control in children than men do, all of his grandchildren will benefit as well. A change in the balance over time between these costs and benefits can occur in a number of ways: falling fertility increases the cost of the disparity in well-being of sons and daughters in the 'no rights' regime,²⁶ or technological change that increases the returns to investments in education makes increasing mothers' weight in family decisions more important for future generations.²⁷

If power within the family is driven by individual control of income and other resources, then government policies, laws and social institutions that influence the economic and political positions of men and women can also affect their relative well-being in households. If men and women have systematically different preferences over how to utilize the resources they command – if women, for example, care more about children – then changing the balance of power in the household can affect society's investment in human resources and the pace of economic development. The connection between female empowerment and child well-being relies both on mothers' traditional role in childcare and on evolutionary arguments that women have an incentive to invest more in fewer children because of limited fecundity and are more certain about maternity than fathers can be about paternity. Advocates of the empowerment of women in developing countries have linked male dominance to adverse outcomes ranging from child mortality and malnutrition to political extremism and terrorism. The rationale for increasing women's access to education and property rights where this access is currently limited rests in part on the prospects for improving child well-being and the human capital of the next generation of workers.

Is it true that women will invest more in children? Many studies have found a significant relationship between women's control of income and child health and spending on children, but not all do so.²⁸ One interesting aspect of time use trends in the United States is that, despite declining fertility, increased preschool enrolment and growing maternal employment, the number of hours devoted to childcare by both men and women increased between 1965 and 2003. Increased childcare by fathers has occurred as part of the juggling in dual-earner households, but the maintenance of mothers' time with children as their participation in the paid workforce increased has been somewhat of a surprise. In part, this is because working women appear to have protected their time with children, and in part because stay-at-home mothers in earlier decades spent little time in direct childcare, as opposed to other household work.²⁹

One substantial challenge to the proposition that increasing the market power of women will improve the well-being of children comes from evidence of increasing inequality in the resources devoted to children in the United States, as parental time and incomes decline in the single-parent households at the bottom of the income distribution (McLanahan, 2004). This is in part the consequence of the very modest social welfare support provided to low-income families in the USA. It suggests, however, that with the changes in family structure that have accompanied the changes in the sexual division of labour, increases in child investments will require not only an increase in women's control over resources, but also a mechanism for maintaining paternal investments in their progeny, either individually or through some collective process.

NOTES

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1. Mulligan (2009).
2. Burda et al. argue that this convergence in hours as incomes rise is best explained by a model in which leisure consumption is driven by strong social cluster norms. As incomes rise, men and women move from gender-specific to gender-neutral reference groups, and their leisure hours converge. It is not clear why gender-specific reference groups should necessarily result in less leisure for women, however.
3. Juster and Stafford (1991) summarize data from rural Botswana and Nepalese villages that show substantially higher work hours for women. Among the candidate explanations they give for the unequal allocation of leisure time in these societies are measurement issues – that the apparent 'free time' of men includes planning and organizing activities – and the possibility that male free time serves as a contingency resource that communities can draw on in case of emergency.
4. Bureau of Labor Statistics, American Time Use Survey Tables, http://www.bls.gov/tus/tables/a1_2008.pdf, 7 April.
5. Aguiar and Hurst (2006). These differences do not control for changes in demographics,

- such as marital status and number of children, which the data reported in the published version of these authors' paper (Aguiar and Hurst, 2007) do.
6. The data and graphic tools provided by Gapminder can easily be used to show this.
 7. Grossbard-Schechtman (2001) provides an intellectual history of the development of the new home economics at Chicago and Columbia.
 8. This argument is developed in Polachek (1981).
 9. England et al. (2002) document a wage penalty for both men and women working in occupations involving care work.
 10. Same-sex partnerships provide an obvious exception. If we take sexual orientation as exogenous, however, this does not alter the basic point.
 11. Echevarria and Merlo (1999), Engineer and Welling (1999), and Hadfield (1999) present interesting variations on such a model. Engineer and Welling show that with heterogeneous aptitudes for home and market work, there exist equilibria in which aptitude, rather than gender, determines training even if marital matching is random (that is, on the basis of 'true love').
 12. This could be considered an early version of the natural experiment.
 13. This association of traditional agriculture with extreme gender specialization and female disadvantage is supported by the Food and Agriculture Organization's characterization of the division of labour between men and women in agricultural societies (FAO, 2009): '... men tend to do the work of large-scale cash cropping, especially when it is highly mechanized, while women take care of household food production and small-scale cultivation of cash crops, requiring low levels of technology. This pattern is particularly pronounced in sub-Saharan Africa, where men and women customarily farm separate plots. Men tend to grow cash crops and keep the income, while women use their land primarily for subsistence crops to feed their family'.
 14. See Smith et al. (2003), and the review and references cited in Winterhalder and Smith (2000).
 15. Greenwood et al. (2005), It would be a mistake to treat the labour-saving improvements in domestic technology as a purely exogenous technology shock. The development of a mass market for electric appliances reflects the rising value of women's time.
 16. Since personality traits are quite stable through adult life, personality measures in 2005 are a good indicator of personality at marriage.
 17. Cohabitation is not distinguished from legal marriage in the GSOEP marital histories, so the increase in cohabitation between the cohorts is not likely to be a contributing factor to the different patterns.
 18. There are substantial variations across countries (OECD, 2009). Switzerland and Turkey are the only OECD countries in which fewer than 50 per cent of upper secondary graduates are female.
 19. A recent and extensive survey of this literature is provided by Rachel Croson and Uri Gneezy (2009).
 20. See McElroy and Horney (1981), Manser and Brown (1980), Lundberg and Pollak (1994).
 21. Pezzini (2005).
 22. Field (2003), Panda and Agarwal (2005).
 23. Chiappori et al. (2002), Rangel (2006).
 24. Aizer (2009).
 25. Though married men consistently earn more than single men (Korenman and Neumark, 1991) and the career prospects of men in the 1950s could be affected by a superior's perception of the supportiveness and stability of their domestic arrangements.
 26. Fernández (2009) finds that property rights reforms occurred earlier in US states with lower levels of survival fertility (by age 10).
 27. Doepke and Tertilt (2009) take a theoretical approach, but note that the historical debates on women's rights showed increasing concern for the education and welfare of children over the nineteenth century. Geddes and Lueck (2002) outline a different path to women's rights in which the increasing returns to human capital made it more

- advantageous to give women control over their own earnings and the incentive to increase them.
28. See Duflo (2005), Lundberg and Pollak (2008).
29. See also Bianchi (2000).

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