

# Multitasking

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**Multitasking**

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# Multitasking<sup>1</sup>

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## Abstract

This chapter reviews economic studies on multitasking in household production. Whereas multitasking or task juggling in the workplace has been analyzed more widely, economic literature on multitasking in a household is relatively scarce. The chapter first provides relevant measures of such multitasking activities, discusses time diary data, and presents some empirical facts employing Harmonized European Time Use Survey data. It then reviews theoretical and empirical contributions to this topic, focusing on childcare, food consumption, and remote work. It also reviews the determinants of multitasking and identifies the factors that are more likely to affect these activities. In addition, it discusses multitasking by certain groups, such as ethnic minorities and children. Finally, it offers policy implications and suggestions for future research.

**Keywords:** household production, multitasking, simultaneous activities, time use

**JEL Classification:** D13, J22, J16

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## 1. Introduction

Multitasking is a widespread phenomenon in the contemporary world. Most of us multitask when, for example, we have a meal and watch the news, do laundry and supervise children, or commute to work and talk on the phone. Performing several activities simultaneously is often a response to a scarcity of time and increased time pressure, called “time stress” (Hamermesh and Lee, 2007). Time stress is particularly evident for high income earners, for parents in general, and for mothers in particular (Hamermesh and Lee, 2007; Craig and Brown, 2016; Craig and Mullan, 2009). Individuals who experience a shortage of time, such as highly skilled individuals or working mothers, have tighter time constraints and higher opportunity costs of non-market time (higher shadow price of time) and, in order to perform certain household production activities, for example, cleaning or childcare, may either outsource these services in the market for pay or perform several activities simultaneously. In particular for women, multitasking offers a way to reconcile work and family responsibilities (household production). Performing multiple activities at the same time thus makes a time constraint less binding.

The importance of multitasking increased even more during the Covid-19 pandemic, which is not to say that it became inevitable, in particular for parents. Remote work and home-based schooling shaped the allocation of time for many households and increased the importance of multitasking behavior. Even before Covid, the importance of multitasking was documented. Studies have shown that a large proportion of households engage in secondary activities and a significant proportion of time is spent on simultaneous activities (see, for example, Ironmonger, 2003; Floro and Miles, 2003; Zaiceva and Zimmermann, 2011).<sup>2</sup>

To measure this multitasking behavior, researchers usually employ time-diary data and, in particular, a question on which other activities respondents performed at the same time as their main, “primary”, activity (i.e., “what else you were doing?”). A respondent then decides which activity is the primary one and which one is secondary. Sometimes, when the data on secondary activities are not available, for example to measure secondary childcare, researchers use information on the presence of children or looking after children while performing certain activities. It was also shown that not including these overlapping activities underestimates the total amount of time spent on household production in general and on childcare in particular (see, among others, Floro and Miles 2003 and references therein; Apps and Rees 2005; Folbre and Yoon 2007; Kalenkoski, Ribar and Stratton 2005, 2007, 2009; Kalenkoski and Foster 2008; Ironmonger 1996; Craig, 2007). Previous research has also shown that, although men usually spend more time on market work and women specialize more in household production, their total time spent on both work activities is roughly similar (see, for example, Burda, Hamermesh, and Weil, 2013). However, when the time spent on secondary activities is also included,

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<sup>2</sup> For example, for Australia, Ironmonger (2003) finds that women report 41 hours per week (almost 40 percent of waking hours) doing simultaneous activities and men report 32 hours per week (30 percent of their waking hours). Floro and Miles (2003) show that in Australia, 30 percent of women and 18 percent of men perform additional domestic chores as overlapped activity (spending additional 49 and 40 minutes per day on these activities), while 42 percent of women and 30 percent of men engage in secondary childcare (spending additional 478 and 303 minutes per day, respectively). Overall, Floro and Miles (2003) report that in their sub-sample, overlapped work activities contribute, on average, 31.6 percent of total working time of individuals, with women’s total time increasing by an average of 218 minutes per day (or almost 44 percent), while men’s time increasing by an average of 100 minutes per day (or 20 percent) (p. 890). Zaiceva and Zimmermann (2011) using the UK time use data show that more than 90 percent of all diaries in the sample are reported to include at least some multitasking, i.e. a positive amount of minutes spent on secondary activities, with white women “stretching” their time the most (by an additional 233 minutes per day), thus trying to squeeze 28 hours of activities into a 24-hours day (pp. 190-191).

women's total paid and unpaid work exceeds that of men, and the gender gap is the largest for parents with small children (Craig, 2007). Thus, incorporating multitasking behavior has important implications for a better understanding of intra-household bargaining and the division of domestic chores, productivity, gender roles and cultural norms, as well as overall well-being and quality of life.

Performing two or more activities simultaneously enables individuals to stretch their time budget, to increase the number of tasks performed, and thus can increase productivity and reduce stress. Indeed, technological progress enabled increased productivity in household production, because time-saving appliances and domestic robots allow several activities to be performed simultaneously (for example, washing dishes and cleaning a house, doing the laundry and playing with children). However, on the other hand, performing several activities at the same time can result in divided attention, reduced concentration, diminished quality of work, decreased efficiency and lower productivity as well as increased stress. Also, when some tasks are performed simultaneously rather than sequentially, they can actually take longer to complete. For example, Coviello et al. (2015a,b) develop a theoretical model of task juggling at the workplace and provide evidence that parallel work increases the time needed to complete tasks, thus reducing productivity<sup>3</sup>. Researchers also suggest that childcare activities that involve multitasking can be lower quality care (Kalenkoski and Foster, 2008), and leisure is also of lower quality when it is "contaminated" by other simultaneous activities (Bittman and Wajcman, 2000; Craig and Brown, 2016).

Multitasking has been analyzed extensively in other disciplines. As suggested by psychologists and neurobiologists, the brain works differently when multitasking, and differently for men and women (see, for example, Gorski, 1987; Just et al., 2001; Rosen, 2008; Lui et al., 2021). The ability to multitask is limited, and individuals' performance can decline if they engage in several tasks simultaneously, though this can be improved by training (Dux et al., 2009). It is important to note that the ability to switch between different tasks depends on the type of task, and it is easier to combine those that are routine and non-contradictory (Manhart, 2004). The more difficult the activities are, the more time that individuals can lose in switching between them, and neural activity in the brain decreases when neurons deal with two thought problems at once, instead of focusing on one task at a time (Just et al., 2001; Manhart, 2004). In addition, decreased concentration and memory problems can arise as a consequence of multitasking. Overall, according to this literature, switching tasks thus leads to decreased productivity (see also, for example, Rogers and Monsell, 1995; Rubinstein et al., 2001; Yeung and Monsell, 2003), juggling tasks rather than performing them sequentially can take longer, and multitasking can save time only if the activities combined are non-contradictory, relaxed, or routine tasks (Manhart, 2004).

Sociologists have also widely studied multitasking. Studies emphasize the significance of a gender divide when simultaneous activities are incorporated into leisure time or home production time, with women generally performing more activities simultaneously than men (see, for example, Sullivan, 1997; Bittman and Wajcman, 2000; Offer and Schneider, 2011; Craig and Brown, 2016). Moreover, for mothers, multitasking at home can be associated with increased negative emotions, stress and work-family conflict (Offer and Schneider, 2011). In addition, as pointed by anthropologists, sociologists, and social psychologists, time perception varies across cultures, because time is a social construction which can be viewed as monochromic, that is, doing one thing at a time, or polychromic, that is, using time for many activities simultaneously (see, for example, Cotte and Ratneshwar, 1999, and the references therein).

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<sup>3</sup> See also Holmstrom and Milgrom (1991) for the principal-agent analysis of multitasked jobs and Foss and Laursen (2005) for empirical analysis.

This chapter focuses on economic studies of multitasking in household production. Although multitasking or task juggling in the workplace has been analyzed more extensively, economic literature on multitasking in households is scarcer. Numerous papers have studied time allocation decisions and household production in general, and many studies employ time-use data to analyze different aspects of time allocation decisions by households (see, for example, Kimmel and Connelly, 2007; Zaiceva and Zimmermann, 2014; Hamermesh and Pfann, 2005a,b; Hamermesh, 2019, and the references therein). This research, however, is beyond the scope of this chapter, which focuses exclusively on multitasking. The remainder of the chapter is organized as follows. Section 2 presents measurements of multitasked activities and provides some empirical facts on multitasking behavior using the Harmonized European Time Use Survey (HETUS) data. Section 3 discusses a theoretical framework for the analysis of multitasking in household production. Section 4 reviews the available empirical studies, determinants, and implications of multitasking for childcare, remote work, food consumption and other household activities. Section 5 concludes and offers policy implications and suggestions for future research.

## 2. Measures and Some Empirical Facts

It is not trivial to measure the extent of multitasking in a household. Usually, researchers employ time-diary data to quantify this phenomenon. A typical time-use survey asks about different activities performed by an individual during the course of a day (often a weekday and a day on the weekend) in certain periods (for example, during 10-minute intervals). In addition to “main” or “primary” activities, some of these datasets include “secondary” (or even “tertiary”) activities that are performed simultaneously (in parallel) with the main ones. A typical question asks respondents, after they have filled in the main activities, “What else were you doing?” A respondent then decides which activity is primary and which is secondary. Some datasets, however, do not record secondary activities. The American Time Use Survey (ATUS), for example, does not provide information on secondary activities, but does contain information about whether children were present while certain activities were performed, or whether children under the age of 13 “were in your care”. This information was used by researchers to construct measures of secondary or “passive” childcare (see Section 4). These differences in the definitions and measures of multitasked activities have to be kept in mind when the results from different studies are compared.<sup>4</sup>

The Harmonized European Time Use Surveys (HETUS), which are harmonized surveys for a number of European countries, is an example of a dataset with information on secondary activities. The survey contains a household questionnaire, an individual questionnaire and a time-use diary, in which respondents are asked to record their daily activities in 10-minute intervals. Two rounds of HETUS data are currently available: HETUS 2000 (conducted in 1998-2006 in Belgium, Bulgaria, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom) and HETUS 2010 (conducted in 2008-2015 in Austria, Belgium, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Luxembourg, the Netherlands, Norway, Romania, Serbia, Spain, Poland, Turkey and the United Kingdom). The third round was scheduled for 2020 but, at the time this chapter was written was not yet available.<sup>5</sup> The relevant question asked in HETUS is

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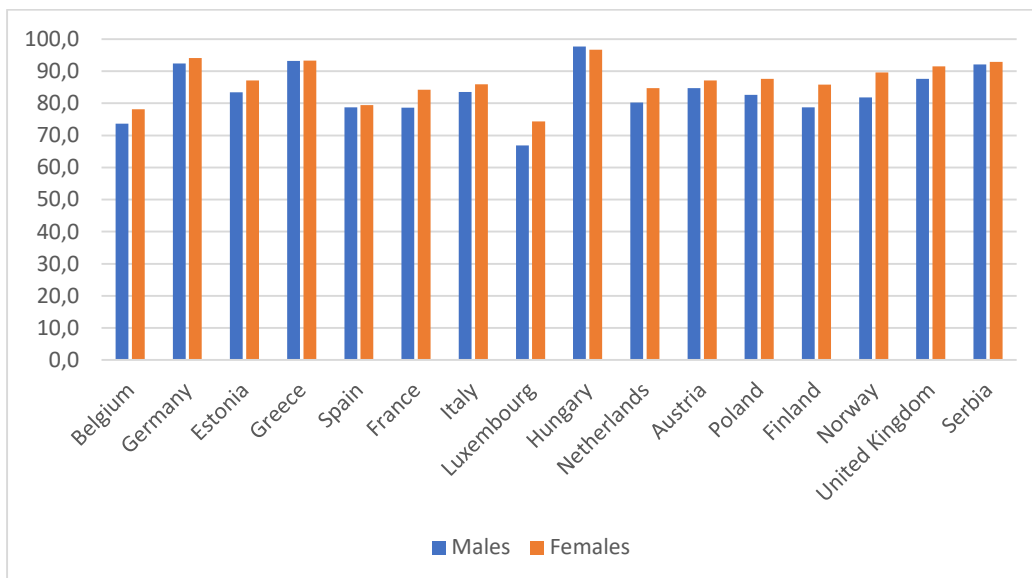
<sup>4</sup> An overview of all available time-use data for the period 2000-2016, with examples of country-specific measures of secondary activities and the challenges in reporting secondary activities is provided in ILO (2018).

<sup>5</sup> More information on HETUS is available at <https://ec.europa.eu/eurostat/web/time-use-surveys>.

“What else were you doing?” - that is, if a respondent was performing any other activity at the same time as the main one. The respondent decides whether to classify an activity as main or secondary.

Figure 1 reports the participation rate in secondary activities (the proportion of respondents who spent some time performing these activities during a day) in available countries that participated in the 2010 HETUS. The Figure shows that multitasking is a common phenomenon, as the rate is quite high: over 90% in Romania, Hungary, Germany, Greece, Serbia and the UK (for females). The participation rate is higher for females in all countries but Hungary. Individuals who participate in multitasking activities also spend quite a lot of time on secondary activities, as suggested in Figure 2. The participation time varies from 2 hours, 41 minutes for men and 2 hours, 50 minutes for females in Luxembourg to almost 7 hours in Hungary (6 hours, 58 minutes for males and 6 hours, 50 minutes for females). Again, in all countries but Hungary the participation time is higher for females.

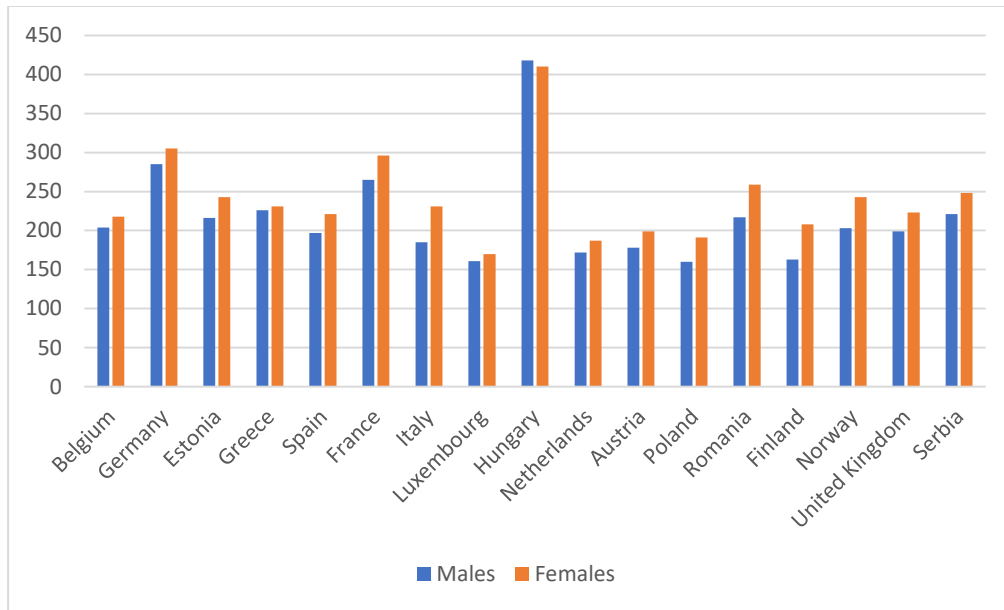
Figure 1. Participation rate in secondary activities, HETUS 2010



Source: Eurostat, HETUS 2010.



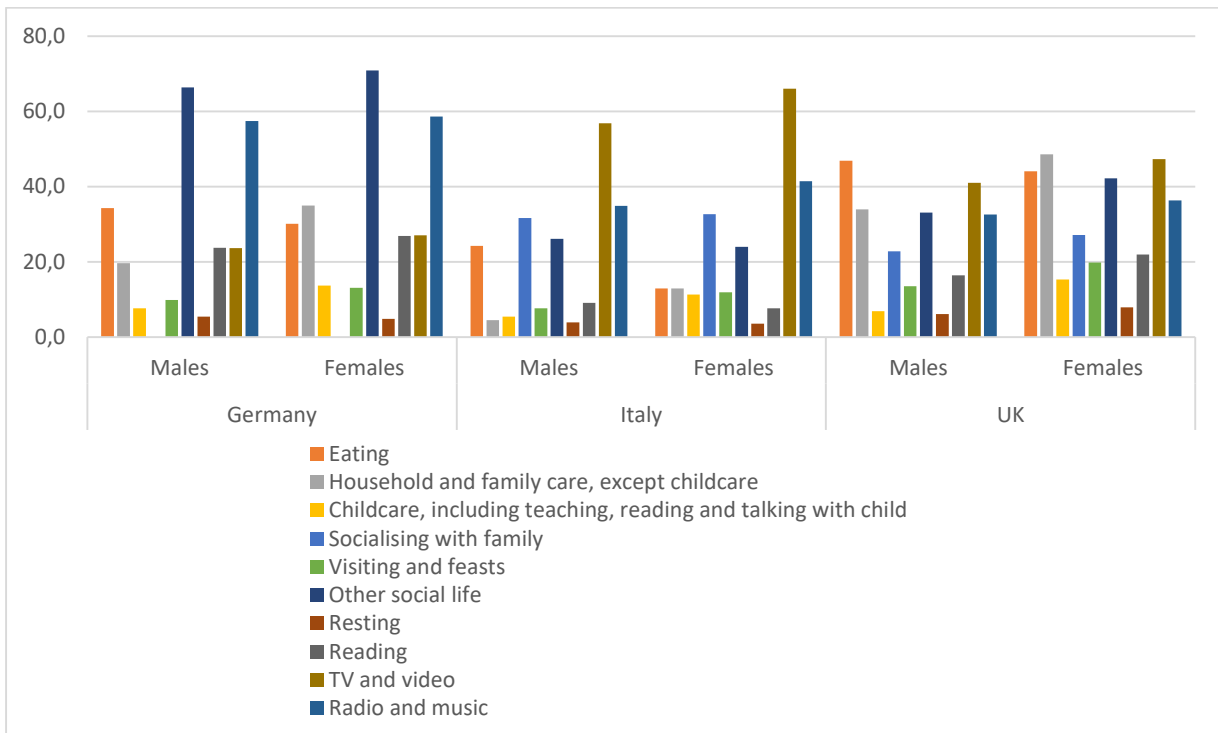
Figure 2. Participation time (minutes) in secondary activities, HETUS 2010



Source: Eurostat, HETUS 2010.

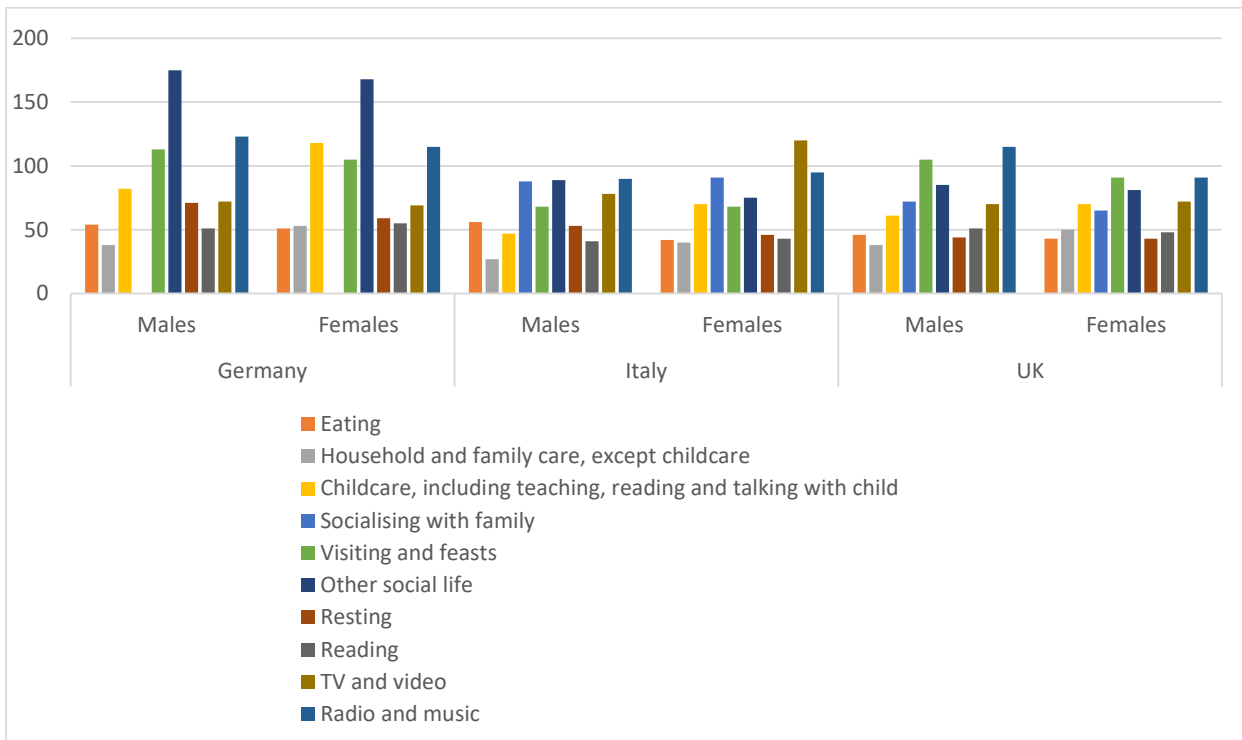
Figure 3 reports the participation rate in secondary activities in three European countries - Germany, Italy and the UK - by the type of the activity. Which activities are performed simultaneously with another, primary, activity? As Figure 3 shows, in Germany they are other social life activities (for example, socializing with friends) as well as listening to the radio and music, whereas in Italy they include watching TV and video, and in the UK female participation in secondary activities is the highest for household and family care (excluding childcare) whereas among males they involve eating food.

Figure 3: Participation rate in secondary activities by gender: Germany, Italy and the UK, 2010  
HETUS



Source: Eurostat, HETUS 2010.

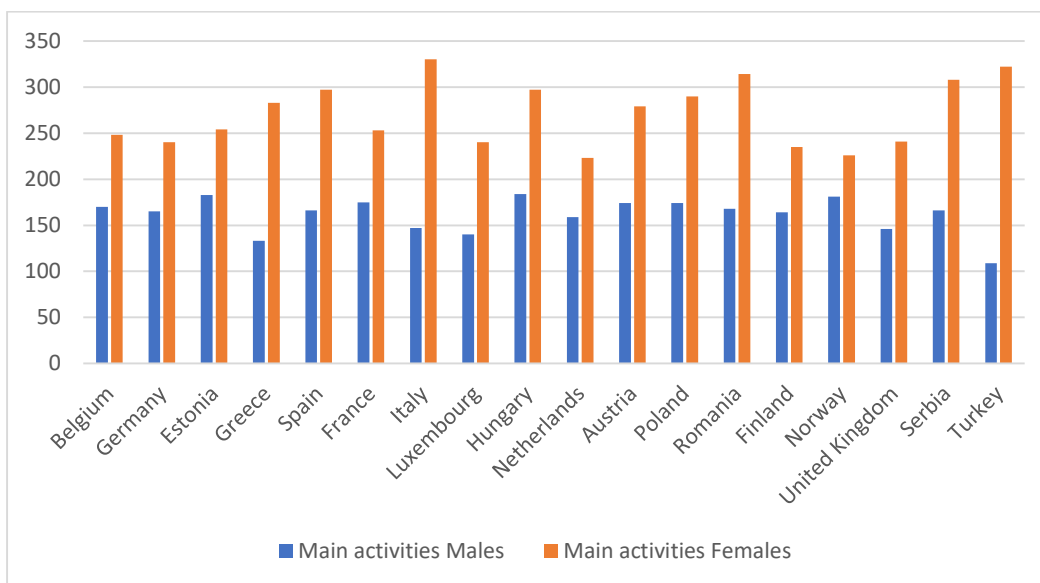
Figure 4: Participation time in secondary activities by gender: Germany, Italy and the UK, 2010  
HETUS



Source: Eurostat, HETUS 2010.

HETUS also contains data on unpaid (as well as paid) work. This category comprises activities such as cleaning, cooking, ironing and other household chores as well as childcare in the household without pay. The average time spent in unpaid work as the main activity varies across countries, and Figure 5 shows, for available countries, that women engage in these activities more. Women spend also more time on unpaid work as a secondary activity in all the countries for which data are available except Hungary, France and Greece (Figure 6). Figure 7 shows, for available countries, that when paid work is added as the main activity, total time spent on productive paid or unpaid work is the highest for women in Romania, Italy and Austria. Women spend more time on both types of work in all the countries for which data are available, except the Netherlands, Norway, Turkey and Austria (in Austria, the time for men and women is the same).<sup>6</sup>

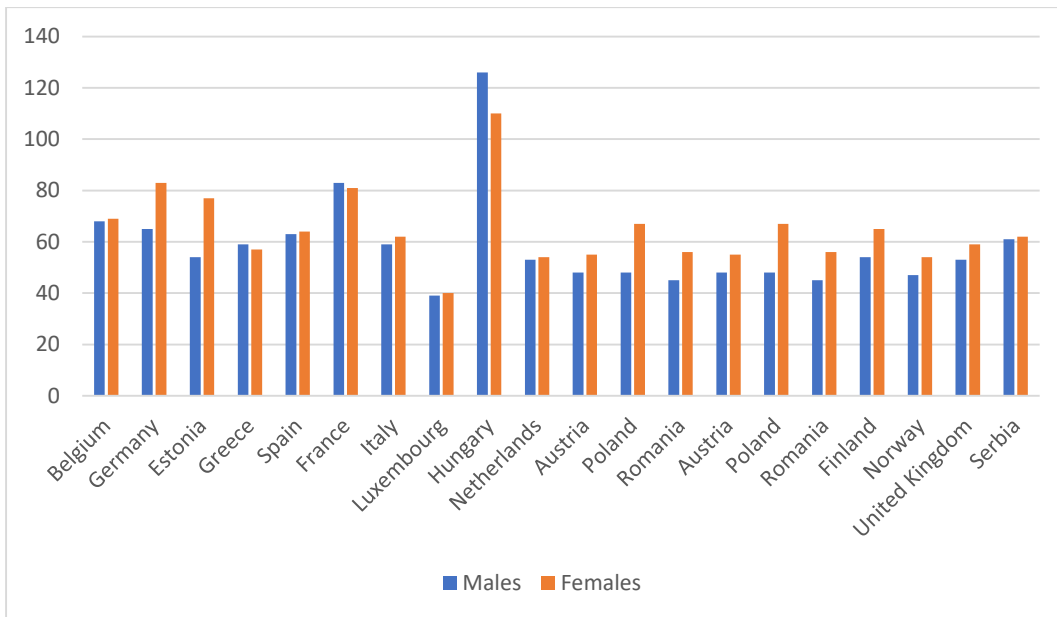
Figure 5. Participation time in unpaid work, main activities, HETUS 2010



Source: Eurostat, HETUS 2010.

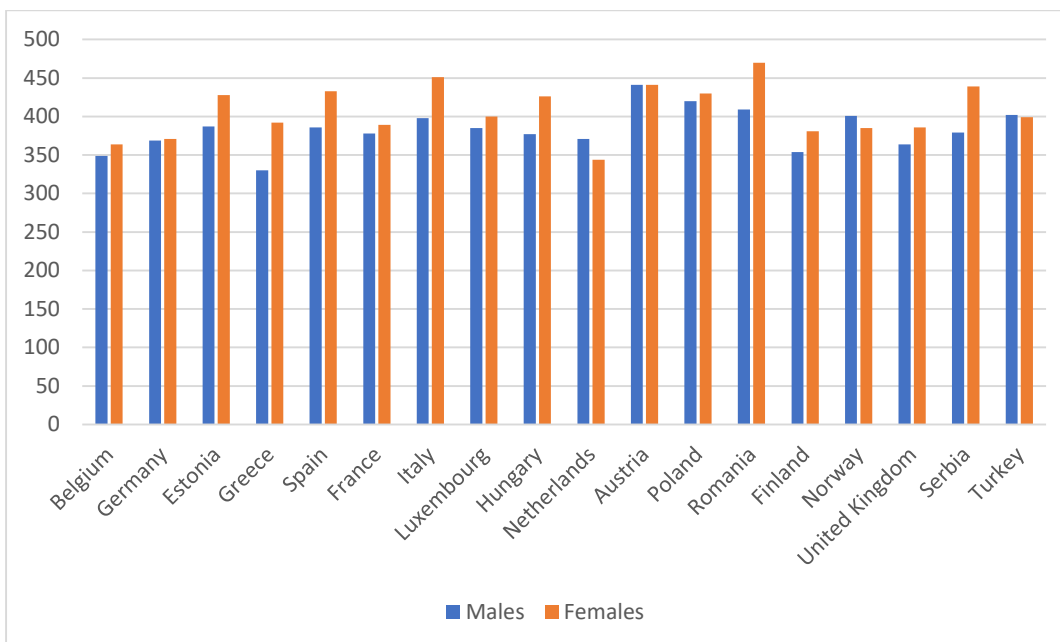
<sup>6</sup> Gimenez-Nadal and Molina (2021) study gender differences in time allocation to paid and unpaid work and childcare in European countries employing the HETUS and the Multinational Time Use surveys (MTUS) data.

Figure 6. Participation time in unpaid work, secondary activities, HETUS 2010



Source: Eurostat, HETUS 2010.

Figure 7. Participation time in paid and unpaid productive main activities



Source: Eurostat, HETUS 2010.

### 3. Theoretical Considerations

In general, multitasking has been neglected in the standard economic household production and time allocation models. In contrast, various studies have been conducted on multitasking or task switching/task juggling in the workplace (see, for example, Holmstrom and Milgrom, 1991; Itoh, 1994; Jirjahn, 2000; Schöttner, 2007; Thiele, 2010; Coviello et al., 2015a,b; Chaudhury, 2016). These studies (see, for example, Coviello et al., 2015a,b) together with the large literature in sociology and experimental psychology (see, among others, Perlow, 1999; Rogers and Monsell, 1995; Rubinstein et al., 2001; Wylie et al., 2009) suggest that task switching reduces productivity. However, as noted in Kalenkoski and Foster (2015), the theory of multitasking in the workplace does not directly apply to multitasking in household work. Multitasking in paid work is different from multitasking in a household, because a household production has no employer and thus no monetary compensation, but involves one person simultaneously performing two tasks (p. 1848). As the authors argue, the negative implications might not hold for household production. Many household production tasks, such as cooking and doing the dishes, do not require an individual's full attention and thus performing them simultaneously can generate a productivity gain. In addition, some tasks can be performed almost automatically, and thus the mental effort required to switch between such tasks is not particularly large, enabling them to be done simultaneously without a loss in productivity (Kalenkoski and Foster, 2015, p. 1849). Indeed, as Kalenkoski and Foster (2016) note, if the output of household production and time allocation decisions involve a gain in utility from producing household commodities (as is assumed in standard household production models), then performing complementary household tasks simultaneously (multitasking) can result in more output than performing them sequentially (Kalenkoski and Foster, 2016, p. 3).

The conventional household production models consider the time allocation decisions of a household in the production of household goods. Time allocation decisions have been analyzed in economic household production models since the seminal contributions of Gary Becker (1965) and Jacob Mincer (1962) (although these arguments had been made as far back as the work by Reid, 1934; for earlier reviews of theoretical models and empirical findings on time allocation and home production, see, for example, Juster and Stafford, 1991 and Gronau, 1986). In particular, Becker (1965) showed that consumers maximize their utility by producing commodities, using market goods and time as inputs while facing budget and time constraints. In this model, a household is viewed as producing household commodities and obtaining a utility gain. According to Becker's model, a comparative advantage from specializing in either market work or home production arises because of differences in productivity in market or household work. Thus, according to this model, if women have higher productivity in home production, they should specialize in household work, whereas men specialize in market work. Extensions to this model are suggested in DeSerpa (1971) and Evans (1972). Pollak and Wachter (1975) criticized Becker's model, pointing in particular that joint production (i.e., multitasking) was not incorporated into the model (another criticism was the absence of constant returns to scale). They argued that a household derives utility not only from commodities that it produces using time input but also directly from using this time, which results in joint production (see also Pollak, 1999, 2003).

Gronau (1977) suggested a simple model of market work, work at home (home production) and leisure, in which time is used at home to produce home goods, which are perfect substitutes for market goods. In particular, he postulated that home production and leisure time should not be combined into a single category (the non-market time is also disaggregated in Graham and Green, 1984). From this

model, it also follows that the choice between producing at home and buying in the market is driven by opportunity costs, and it also follows that time spent in home production is independent of non labor income. Williams and Donath (1994) incorporated simultaneous uses of time into their model of household production and estimated household production parameters using Australian Time Use data. They developed a household production function that enables the performance of more than one activity at a time. They followed Gronau (1977) and assumed that a commodity produced at home is a perfect substitute for a market-produced one, and followed Graham and Green (1984) in using a Cobb-Douglas production function. In the model, the production of household goods is a function of inputs purchased in the market, weighted hours of labor inputs, household capital stock and the characteristics of the household and its members. The costs of goods produced at home is the sum of purchases of physical inputs and the opportunity cost of labor, which are minimized subject to total consumption and the home production function. They used simultaneous uses of time to redefine input hours variables, which are a weighted average of primary and secondary time-use activities. Their empirical results suggest that giving equal weight to primary and secondary activities fits the data the best - that is, input hours into both primary and secondary activities should be weighted equally at half (although one activity is coded as “primary” and the other as “secondary”). Subsequent contributions have considered intertemporal time use and employed dynamic life-cycle models. Other work on intra-household time and resources allocation developed cooperative and non-cooperative bargaining models of labor supply and household production (see, for example, Chiappori, 1988, 1992, 1997; Apps and Rees 1996, 1997). Rapoport, Sofer and Soaz (2011) extended the models of collective bargaining in a theoretical model by including household production.

Multitasking is incorporated into the theoretical models of home production in more recent work. Hamermesh (2010) developed a theoretical model of multitasked food consumption (which he calls “grazing”) in a household production framework and estimated the determinants of primary and secondary eating (see the next section). In the model, a consumer maximizes utility that includes food and non-food commodities. The author assumes that primary eating involves fixed set-up costs which reduce the time available for other things, whereas this is not the case for grazing. The food and non-food commodities are produced using purchased goods and time inputs, including time for primary and secondary eating. An important assumption in the model is that time spent in producing other commodities is a decreasing function of time spent on grazing - that is, the more an individual grazes, the lower is the productivity of time in the primary activity performed simultaneously with grazing. As in a standard Becker’s model of household production, an individual faces goods and time constraints, in which time now includes the time spent on market work, non-food activities, and primary eating activities. The model also predicts that higher wage rates (price of time) lead to substitution of grazing for primary eating, that is, a higher wage results in an increase in the amount of time spent grazing relative to the amount of primary eating/drinking.

Kalenkoski and Foster (2015) (see also Kalenkoski and Foster, 2016) focus explicitly on multitasking and develop a theoretical model of home production that incorporates multitasking; it is also the first study to test the implications of the model in an experiment. As noted by the authors, childcare constitutes a main component of household production for many households, and it is often combined with other household activities. Therefore, in their model there are two commodities, a child good and a household good, which generate utility for an individual in a household and are produced with time inputs. The time can be spent on producing only one particular commodity (sole-tasked) and on producing both commodities (multitasked). Individuals then maximize utility subject to the

commodity production functions and a time constraint<sup>7</sup>. Their model implies that an increase in multitasked activity productivity increases time spent on multitasking. It also implies that gender differences in multitasking behavior can be explained by gender differences in productivity (implying, in turn, that these differences could also depend on gender differences in the utility parameters as well as in the total time available for household work (p. 21)).<sup>8</sup> Their analysis also suggests that gender differences in sole-tasking and multitasking productivity factors are crucial in explaining differences in the decisions about time allocation to multitasked versus sole-tasked activities as well as differences in the amount of household and child goods produced.

The authors then test the implications of their model in a controlled laboratory experiment, in which participants completed simulated household tasks. The experiment consisted of five stages, with an infant-care task and a clothes-sorting task, both of which could be performed alone (sole-tasked) or simultaneously (multitasked), generating different payoffs. The experiment was conducted in a computer laboratory, in which participants had to click on a correct icon on their screens. This experimental setup allowed the tasks to be somewhat automated as in real life, and they did not require the participants' attention all the time. The experiment enabled to estimate directly the relative productivity parameters<sup>9</sup>, suggesting that multitasking increases total household output (Kalenkoski and Foster, 2015). Their results also show that men and women are equally productive in sole-tasked production of both commodities, and in multitasking when producing child commodity (Kalenkoski and Foster, 2016). Interestingly and in contrast to the previous literature, they found that men, not women, were more productive in multitasking when producing household good (simulated clothes sorting), and this result was robust to a regression adjustment after controlling for self-reported experience in playing video games.

Sanchis (2016) incorporates joint production into the model of household production by defining matrices of different types of goods and time inputs that can have different uses. In this framework, any possible combination of time or goods can potentially produce more than one commodity (i.e., joint production). The example given by Sanchis (2016) considers two commodities, a meal and listening to music. To produce these commodities, the inputs of both goods (e.g., meat, potatoes and a CD player) and time (cooking time in the kitchen and eating time in the dining room, as well as time listening to music in the kitchen, and time listening to music and the dining room) are needed. In this model, using the same time inputs (cooking time and eating time), the consumer can jointly produce two commodities – a meal and listening to music. In this framework, Sanchis (2016) extends the theory of the allocation of time by incorporating joint production into a Becker-type model, in which Becker's model constitutes a special case.

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<sup>7</sup> There is no budget constraint in the model and no other inputs of goods. Note also that the authors do not incorporate labor market work.

<sup>8</sup> In particular, partial derivatives of multitasked time with respect to productivity parameters suggest that an increase in sole-tasked childcare productivity reduces the time spent on multitasked childcare. Similarly, an increase in sole-tasked housework productivity reduces time spent multitasking. Finally, an increase in the multitasked housework productivity increases time spent multitasking. Regarding sole-tasked time, time spent on sole-tasked child commodity decreases with an increase in multitasked time productivity in the household commodity, and increases with an increase in the sole-tasked childcare productivity. Similarly, sole-tasked time spent on housework increases with an increase in the productivity of sole-tasked time in production of the commodity and decreases with an increase in the other productivity parameters. The results for the partial derivatives of child and household commodities with respect to the productivity parameters are as follows. An increase in the productivity parameter of sole-tasked childcare increases the child commodity. In contrast, an increase in the productivity of sole-tasked housework reduces childcare. Finally, an increase in either of the multitasking productivity parameters increases production of the child commodity. The results for the household commodity are similar.

<sup>9</sup> that is, the ratios of multitask to sole-task productivity factors. These ratios were greater than 0.5 and less than 1.

## **4. Empirical Contributions on Multitasking in Household Production**

The empirical economic literature on multitasking in the household is richer. Charlene M. Kalenkoski and Gigi Foster (Kalenkoski and Foster, 2016) provide an excellent collection of recent work on this topic. The volume comprises both theoretical work (see Section 3) and empirical studies on multitasking. An important household activity that has attracted a lot of interest in the literature is childcare and related parental investment in children, and a number of studies analyze childcare in combination with other activities (see, for example, Kalenkoski, Ribar and Stratton 2005, 2007, 2009; Kalenkoski and Foster 2008). Ironmonger (1994, 1996) , Craig (2007) and Floro and Miles (2003) show that omitting overlapping activities leads to an incorrect measurement of time spent caring for children and of the workload for women in general. Studies also showed that workers in the informal sector, home-based workers, and self-employed women multitask more often and frequently combine work activities with domestic chores (see Floro and Miles, 2003 and references therein).

Omitting overlapping activities also underestimates the extent of a gender divide within a household, that is the gender gap is larger when secondary or overlapped activities are considered (Floro and Miles, 2003; Craig, 2007; Craig and Brown, 2017; Sayer, 2007; Sayer et al., 2009; see also Apps and Rees, 1997, and Apps et al., 1996). For example, Craig and Brown (2017) show that there exist substantial differences in parents' time pressure as mothers experience more "contaminated" leisure (i.e. leisure combined with other activities) and less pure leisure and do more unpaid household work multitasking than fathers, thus feeling also more rushed than fathers. Indeed, it has been shown that multitasking is often a relevant strategy for individuals who are "time squeezed" and who wish to "stretch" their time budgets in order to cope with time pressure. As such, multitasking can often result in increased stress, decreased quality of output and productivity, and decreased well-being. However, some secondary activities that are performed simultaneously with primary activities can make the latter more pleasant and enjoyable, such as listening to music while doing household chores. Still, if pure leisure is "contaminated" by other activities that an individual needs to perform at the same time, it will be of lower quality, and thus overall satisfaction may decrease (Bittman and Wajcman, 2000; Craig and Brown, 2017).

### **4.1. Determinants of Multitasking**

Many factors are important with respect to the determinants of multitasking. Clearly, one of them is gender, as women tend to multitask more than men. The household composition and life cycle are also important, because time pressure increases with the presence of children, in particular, small children, and declines at later stages as children grow up. Educational attainment also plays a role. The opportunity costs of time are higher for highly educated individuals, particularly women, and they are more likely to work and spend more time working. This could make them more likely to purchase certain household services (e.g., cleaning or childcare) in the market or to multitask. Moreover, it might be that highly educated individuals have higher standards and attribute more importance to the quality of output (for example, higher standards of cleanliness, better care of children, or more engagement in childcare), thus making them more likely to multitask, instead of purchasing market substitutes (see Floro and Miles, 2003 and references therein). Income is another important determinant of the extent of overlapping household activities. Individual earnings influence bargaining power within the household, in particular the division of household labor, which in turn



can affect the pressure to multitask. Moreover, individuals with higher income can afford to buy time-saving devices or to outsource certain services in the market (Floro and Miles, 2003). An individual's employment status and job characteristics are also important. Whether an individual is working full-time or part-time and whether he or she needs to commute to a job determines the amount of time an individual can spend in the household, whereas a flexible work schedule and the possibility of working from home can affect the organization of time and the opportunity to multitask. Cultural norms might also matter. Some cultures have stronger social ties and family networks. Extended families can assist with household chores and supervising children when needed. Finally, attitudes toward working women, the household division of labor and purchasing certain services in the market also vary across cultures.

Floro and Miles (2003) employ the 1992 Australian Time Use data to study the incidence and determinants of overlapping (secondary and tertiary) activities, differentiating between (household and market) work and non-work activities. They show that including such overlapping activities results in more precise estimation of the economic contribution of individuals, in particular in non-market production. For example, they estimate that by performing overlapping work activities, women increased their economic activities by 8-15% whereas men "stretched" their time by 3-7%. The authors then employ a Tobit model and show that women, younger individuals (those at the earlier stages of the household life cycle), and highly educated individuals multitask more, whereas immigrants (those whose primary language is not English) multitask less. The presence of both young (age 0-4 years) and older children (age 5-14 years) increases the incidence of overlapping activities in the household, with a larger coefficient for the former variable. Increasing income, in particular, at higher ranges, decreases the incidence of multitasking, suggesting that individuals with higher incomes might have a greater ability to negotiate a division of labor within the household that would decrease the need to multitask, and they also might be more likely to purchase time-saving devices and certain services in the market. In addition, Floro and Miles (2003) found that individuals who work from home and those who have multiple jobs are more likely to increase the amount of time in overlapping activities, as are those who have children with bad health conditions.

Zaiceva and Zimmermann (2011) focus on ethnic differences in multitasking behavior and also analyze other determinants, using the 2000 UK Time Use survey. Regarding the general determinants of overlapping activities, they find, in line with other literature, a higher incidence of multitasking among females, those who are highly educated, married, those who have children and individuals under time stress (who "always feel rushed"). The impact of income is negative, which again may suggest that for these individuals the time constraint is less binding so they might not feel the need to multitask. The correlation with employment is also negative (which is in line with, e.g., Floro and Miles, 2003) and potential explanations of this effect include the time constraint (the more time a person spends working for pay, the less time there is for other activities, including overlapping activities), a higher likelihood of outsourcing services in the market, instead of engaging in household activities either separately or simultaneously, as well as lower utility when engaging in secondary activities that are combined with primary ones. A further analysis revealed that the negative employment effect is attributable exclusively to the effect for women, which points to household bargaining models, because employed females have higher influence in household decision making and are better able to bargain on the division of household chores, making them feel less pressure and less need to multitask home production activities. On the other hand, the positive education effect suggests that those with higher education have higher time constraints and larger opportunity costs of non-market time; and these individuals with a high shadow price of time experience more time

stress and, willing to “stretch” the available time, engage more in multitasking (Hamermesh and Lee 2007; Ruuskanen 2004).

## **4.2. Multitasked Childcare**

Childcare is an important activity, an investment, to which parents devote a substantial amount of time, and some of this time may be dedicated to performing childcare simultaneously with another activity. Kimmel and Connelly (2007) suggest distinguishing childcare from other household production activities and leisure and analyzing it separately. They find that mothers’ childcare time increases with the number of children and the price of childcare and the mother’s own wage and decreases with the age of the child. Importantly, it has been shown that omitting overlapped activities and analysing childcare time as the “main activity” only underestimates the total amount of time parents, and especially mothers, devote to their children (Folbre and Yoon, 2007; Craig and Brown, 2016; Ironmonger , 1994, 1996; Craig, 2007; Floro and Miles, 2003).

Kalenkoski, Ribar and Stratton (2005, 2007, 2009) incorporate secondary or passive childcare activities into the analysis. Kalenkoski et al. (2005) employ the 2000 UK Time Use Survey data and focus on primary childcare activities, secondary childcare activities (when primary activity is not childcare), and market work, differentiating between different types of households (single-parent, cohabiting and married couples). They estimate a system of correlated Tobit models and find that single parents spend more time on childcare and less time on market work than other parents, whereas married and cohabiting parents have a more similar division of time. They report that single-parent households spend more time on secondary childcare. In addition, households with more children, particularly those under the age of 12 engage more in secondary childcare, as are individuals with disabled children and those who are highly educated (the latter two findings hold only for women). Interestingly, men allocate less time to secondary childcare if there are other adults in the household and spend more time on secondary childcare on weekends.

Kalenkoski et al. (2007) employ time-use data from the UK and the US to investigate the impact of family structure on primary and passive childcare and market work, using a system of correlated Tobit equations and accounting for selection into the family structure. Passive childcare in this study is defined as the sum of all non-primary childcare time spent with children age 14 or younger (except for time spent sleeping, working, or on personal care activities). Their main findings indicate that, as in the above study, in both countries single parents spend more time on childcare than married or cohabiting parents, whereas after observable differences in family structure and background were controlled for, no significant difference was found between married and cohabiting parents in the allocation of time. With respect to secondary (or passive) childcare, their results indicate that, in both countries, when selection into the family type is controlled for, married men and women spend significantly less time on secondary childcare than single parents. In addition, having small children increases involvement in secondary childcare for women, in particularly on weekdays, whereas for men the effect is mostly insignificant (the only exception being the number of children 7-11 years old). Additional results indicate that having higher education has an insignificant effect on passive childcare in both countries and for both genders, whereas the presence of other adults in the household affects the time spent on secondary childcare negatively for both men and women in the US and only on weekends in the UK.

Kalenkoski et al. (2009) study the impact of own and partner's wages on childcare and market work time using the UK Time Use Survey data and including both primary and passive childcare activities. As above, passive childcare is defined as the sum of time spent with children younger than 14 years old that is not spent on childcare as a primary activity and with the exception of time spent sleeping, working, or on personal care activities. Their main results indicate that women whose partners have higher potential wages spend significantly more time on primary childcare on all days; whereas men whose partners have higher potential wages spend significantly more time only on secondary childcare and only on weekends. They also find that neither men's nor women's childcare time is significantly related to their own wages. Overall, their results suggest that increasing women's wages may have led men to spend more time on passive childcare.

Using Australian time diary data, Kalenkoski and Foster (2008) consider secondary childcare as lower-quality care, present several definitions of childcare, and investigate the determinants of time spent on high-quality childcare, lower-quality childcare and market work. Their first definition of secondary childcare is the sum of the minutes during which a person reported being engaged in certain childcare tasks in a secondary or even tertiary capacity (the same definition as in Kalenkoski et al., 2005). Their second definition exploits the information on who was present with a respondent during this activity. Passive childcare thus is defined as the sum of the minutes during which a person was with a child (age between 0 and 11 years) and did not report being engaged in a child-related primary activity (this classification was used in Kalenkoski et al., 2007). Their third definition, "development-oriented care", is the sum of the minutes during which a person reported being engaged in a "development-oriented" childcare task, such as "teaching, playing or performing physical or emotional care of children" (p.246). In this classification, there is no distinction between primary, secondary, or tertiary activity. Their final definition considers sole-tasked childcare as high quality care and multitasked childcare as lower-quality care. To define sole-tasked care, they add up the number of minutes during which a person reported performing any childcare task as a primary activity (for children age 0–14 years) and did not report being simultaneously engaged in any non-childcare activity. This measure is different from the one that uses childcare as a primary activity, because an individual engaging in primary childcare activity could still perform a secondary or even tertiary activity simultaneously. In turn, multitasked childcare time is defined as the sum of the minutes during which a person reported being engaged in any childcare task, whether primary or not, while also being simultaneously engaged in a non-childcare activity.

Kalenkoski and Foster (2008) then estimate correlated Tobit models of the determinants of the amounts of high-quality and lower-quality time spent on childcare and in market work. Their main results indicate that parental investment in childcare time depends on the definition of lower-quality and high-quality childcare, reflecting differences in parental preferences and time resources. Regarding specific variables, they find that nonparental substitutes for parental childcare substitute mostly for parents' lower-quality care and matter for both mothers and fathers. They also find that, on weekends, lower-quality care increases for both genders, and that some of the increase in fathers' lower-quality care on weekends might be substituting for mothers' high-quality care during the week. Finally, they found that highly educated mothers and fathers both spend more time on childcare, in particular on development-oriented care.

Craig and Brown (2016) focus on childcare, consider a "multitasking parent", and confirm, in line with previous research, that additional time pressure on a household introduced by children is often coped with by multitasking, that is, performing childcare simultaneously with other activities (see Craig and Brown, 2016 and the references therein). They note that combining two productive work activities, such as domestic work and childcare, can be particularly stressful, and investigate the

relationship between multitasking and subjective time pressure. They employ the Australian Time Use data for 2006 and compare different measures of multitasking between parents and nonparents, such as the amount of daily time spent multitasking, activities that are multitasked more often, the proportion of the day that is spent multitasking, and the number of episodes of multitasking per day. The authors find that, for non-parents, multitasking involves mostly leisure and recreation activities, whereas for parents, childcare (and, to a lesser extent, domestic chores) is more commonly multitasked with nonwork activity than is paid work; moreover, mothers spend the most time on multitasking activities. In addition, whereas fathers combine childcare mostly with leisure activity, mothers' multitasked childcare is combined more equally with work and nonwork activities. Their regression analysis confirms the gender gap in multitasking, *ceteris paribus*. Finally, their results show that total amount of multitasking is associated with higher reported time stress, whereas a higher proportion of work/nonwork multitasking is associated with lower reported time stress. The later findings imply that combining childcare with other work activities makes it more stressful, whereas combining it with leisure makes it more pleasant, confirming that the type of activity is also important.

The estimates of any multitasked activities depend on the quality of data. For example, the ATUS dataset in general does not report secondary or overlapping activities. The quality of the secondary childcare measures in this dataset is evaluated in Stewart and Allard (2016). They examine three measures of childcare available in the ATUS, in particular, childcare as a primary activity, time spent with children, and childcare while doing something else (secondary childcare). Primary childcare includes activities such as reading or playing with children, feeding, bathing, or dressing children. Time spent with children is measured when parents are physically with their children. The ATUS measure of secondary childcare is not a typical "what else were you doing" question; rather, respondents are asked to identify the times and activities during which at least one child under 13 years old was "in your care". Thus, given the nature of this measure, it requires the respondent to be close to a child and knowing what the child is doing, but not necessarily to be in the same room and to be "with" a child.

Stewart and Allard (2016) report that parents spend substantially more time on childcare as a secondary activity (with children in their care), rather than as a primary activity (5.8 hours per day vs. 1.8 hours per day), with a larger difference for women than for men. In addition, 93 percent of fathers and 98 percent of mothers spend at least some time in secondary childcare (and a similar percentage spend at least some time with children), whereas only 62 percent of fathers and 86 percent of mothers engage in childcare as a primary activity. They also report that most of secondary childcare episodes occur when a child under the age of 13 is present (around three-quarters of the episodes). Regarding primary activities that are combined with secondary childcare, the authors show that in almost 80 percent of the episodes secondary childcare is provided when the primary activity is household chores, and in about half these episodes respondents were with their child under the age of 13. Leisure is the second activity most often combined with secondary childcare with no child under 13 present, and about two-thirds of that time is spent with a child under 13. Overall, these results suggest that providing secondary childcare with no child under 13 present is more common for household work and leisure activities, because these activities do not necessarily require interacting with children. The authors also analyze different factors that can affect respondents' reporting, such as day-specific, respondent-specific and interview-related factors. Overall, they conclude that the secondary childcare measure in the ATUS captures passive childcare accurately, and their estimates indicate that it overestimates the time spent on secondary childcare by at most 5 percent (i.e., around 16 minutes per day).

### **4.3. Food Consumption and Multitasking**

Food preparation and consumption are other activities that may be multitasked quite often. It has been documented using ATUS and other datasets that since mid-1970 the time spent in eating as a primary activity has declined, and the time spent in eating as a secondary activity has increased; moreover, a significant increase in secondary eating time is associated with an increase in women's wages (Zick and Stevens, 2011).

Hamermesh (2010) finds that secondary eating ("grazing") increases for individuals with higher wages, that is, those with high opportunity costs of time, who multitask food consumption with another primary activity. He develops a theoretical model of household production (see Section 3) that predicts that higher wage rates (price of time) lead to substitution of grazing for primary eating and confirms these predictions using the ATUS Eating and Health Module (EHM) data. The results of the empirical analysis confirm that grazing and intervals of grazing increase with wages. He also shows that eating meals more frequently is associated with a lower BMI and better health, while the relation with grazing time is weak.

Hamrick (2016) employs the 2006-2008 ATUS and EHM data, studies eating as a multitasking activity and reports that slightly more than half of Americans age 18 years or older engage in secondary eating (51.5 percent, adding 27 minutes to their day). The activities that were combined with secondary eating or secondary drinking most often were watching television, paid work, socializing, grooming, and food and drink preparation, as well as driving for travel (see also Hamrick et al., 2011). The probability of engaging in secondary eating was found to be higher for females, younger individuals, those with higher educational attainment and higher income as well as those with children, whereas noncitizens and ethnic minorities engaged less in secondary eating. No significant differences were found between employed and not employed, *ceteris paribus*, however, those in paid work on an average day had a higher association with probability of secondary eating, with a larger impact for those who worked for 12 and more hours. Also, time spent in primary eating/drinking and the number of primary eating/drinking episodes was negatively associated with the probability of engaging in secondary eating.

### **4.4. Remote Work and Multitasking**

Another important potential for multitasking in the household arises when there is an opportunity of a remote work (home-based work or telework). During the Covid pandemic, remote work has increased to unprecedented levels, suggesting potentially important implications for within-household time allocation including multitasking decisions. For example, working from home allows a person not only to save time on commuting to work and use this saved time for household production activities or leisure but also possibly to combine work with some domestic activities. By saving time and reducing stress associated with commuting, remote work may increase productivity. However, remote work combined with multitasking may also lead to decreased concentration and productivity and increased stress.

Gimenez-Nadal et al. (2019) consider remote work using American Time Use Survey data over the period 2003-2015, including the Well-being Module for 2012 and 2013. They report, among other results, that, compared to commuters (office-based workers), male teleworkers experience less stress,

fatigue and pain, whereas no significant differences were found for women. The explanations for these findings include the increase in non-market work for women in the hours during which they are not doing paid work, such as later in the evening (whereas males experience an increase in leisure activities). Regarding multitasking, the authors document that both male and female teleworkers report significantly more time spent on multitasked childcare when they are working remotely. In particular, they consider two variables: the first identifies who else is present while a respondent is working, and the second asks whether the parent was caring for a child less than 13 years old at the time of the activity (see also Section 4.2). They report that male and female teleworkers spend, respectively, 14.27 and 12.01 minutes of their market work time per day in the presence of at least one child (whereas the time for commuters is 2.41 and 3.06 minutes, respectively). Moreover, male and female teleworkers spend 49.12 and 62.44 minutes of market work time, respectively, caring for at least one child under 13 (whereas male and female commuters spend only 3.56 and 8.35 minutes, respectively).

Pabilonia and Vernon (2021a) also focus on telework. They employ the 2017-2018 American Time Use Survey Leave and Job Flexibilities Module and estimate the wage differentials between teleworkers and office workers as well as analyze their time allocation decisions. They find that some teleworkers earn a wage premium, which varies by occupation, parental status, teleworking intensity and gender; in particular, a wage premium was found for male but not female home-based teleworkers<sup>10</sup>. Regarding time allocation, Pabilonia and Vernon (2021a) report that teleworkers spend less time on commuting and grooming and more time on leisure and household production activities. They also spend more time with family. In particular, regarding childcare, they show that parents spend more time with their children on work-from-home days versus days in the office. Fathers who work from home spend 26 minutes more on primary childcare activities than those who work in the office, and much of this additional time with children is devoted to after-school hours. For mothers, the additional time with children is more evenly distributed across working hours on work-from-home days. Moreover, on work-from-home days mothers work 57 minutes with their children present, whereas fathers work 27 minutes with their children present. Pabilonia and Vernon (2021b) present a comprehensive review of the studies on telework and discuss its implications for workers' productivity, wages, labor force participation, and well-being as well as its impacts on traffic congestion and greenhouse gas emissions. Overall, they conclude that time saved on commuting and grooming is reallocated to household and leisure activities, but differently for men and women: whereas men spend most of this additional time on leisure activities (however, fathers also increase time on primary childcare), women increase their household production. Parents also spend more time with children. The authors also suggest that productivity increases for some teleworkers, generating a wage premium for them, although mothers would accept lower wages for the opportunity to work from home. While not considering multitasked household activities directly, these two studies are in line with the findings in Gimenez-Nadal et al. (2019), suggesting an increased proportion of time devoted to household production activities (in particularly childcare) and leisure for teleworkers, likely including multitasked activities.

A recent study by Pabilonia and Vernon (2022) examines time allocation to paid work, household chores and childcare by parents in dual-earner couples before and during the pandemic employing the ATUS and Current Population Survey COVID-19 data and differentiating between the primary and secondary childcare. They report that when both parents worked from home compared to both

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<sup>10</sup> In line with this, Bonacini et al. (2021) suggest that an increase in the possibility of working from home would be associated with an increase in labor income, but it would favor men, older, and highly educated and highly paid employees, exacerbating inequalities in the labor market.

worked on-site, mothers and fathers spent roughly equally less time working for pay and more time on secondary childcare, while fathers spent more time on household chores, however, only mothers working from home spent more time on childcare in the autumn 2020. In addition, mothers who worked from home spent about a half an hour more time working with a child in their presence than did fathers. In 2020, on workdays when working from home, 53 percent of fathers and 75 percent of mothers had at least one child present at home in the core work hours, between 9 a.m and 2 p.m. Secondary childcare time has increased significantly during the pandemic both for fathers and mothers with a particularly large increase for mothers (from 2.64 to 3.87 hours and from 3.86 to 6.26 hours, respectively, while the corresponding increase for primary childcare being from 0.92 to 0.93 hours for fathers and from 1.52 to 1.64 hours for mothers), thus suggesting an increased importance of multitasking during the pandemic. In addition, during the pandemic, mothers and fathers working from home spent on average 1.6 hours and 0.8 hours per day working with children in their presence, an increase compared to pre-pandemic averages by 0.8 hours and 0.2 hours respectively. Parents spent even more time working from home with children in their care (secondary childcare) during the pandemic: 4.9 hours mothers working with children in their care, while fathers spent 2.6 hours working with children in their care. The regression results confirm the larger gap in secondary childcare during the pandemic and especially among those working from home. The authors also find that during the pandemic, the gender difference in the gap in total childcare (primarily plus secondary childcare) by working-from-home status was larger for mothers. Together with the result that mothers spent also more time on household production, these results suggest that mothers experienced heavier burden during the pandemic. Finally, both before and during the pandemic, mothers working from home had more work episodes, i.e. interruptions in their work, than mothers working on-site, while fathers experienced fewer interruptions, which suggests important negative implications for productivity and mental well-being of mothers.

Finally, in a recent work, Kosteas et al. (2022) focus on the implications of the Covid-19 pandemic for telework, document a dramatic increase in remote work during the pandemic, review relevant literature on remote work, and confirm that married women, individuals with children, and the highly educated are more likely to work from home. They also review the impact of working from home for the gender wage gap, inequality, mental and physical health and workers' productivity, reporting, in particular, that women and workers in low-paid occupations faced the largest decrease in productivity and mental health and increased stress during the pandemic, much of which could be attributable to the closure of schools, the presence of children at home, and increased childcare responsibilities. The authors suggest that telework, to some extent and for some occupations, is likely remain in the future, and hybrid work arrangements will likely dominate in the labor market. This in turn suggests important implications for time allocation decisions within households, including multitasking household activities.<sup>11</sup>

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<sup>11</sup> There is a rapidly growing literature on the implications of pandemic and work-from-home arrangements for employment and hours worked as well as household production activities, which generally suggests heavier burden for mothers (see, among others, Adams-Prassl et al. 2020, Adams-Prassl, 2021, Del Boca et al., 2020, Farre et al., 2021, Lyttelton et al., 2022).

#### **4.5. Multitasking by Immigrants and Ethnic Minorities**

It is likely that immigrants have different time allocation decisions from native-born because of their different experience in the labor market and society in general, different opportunity costs of time, cultural norms and preferences. For example, Hamermesh and Trejo (2013) study immigrants' assimilation in terms of their use of time. They develop a theoretical model of assimilating activities that predicts that immigrants spend more time in such activities than natives and test its implications using American as well as Australian Time Use data. The empirical results confirm the predictions of the model, as they find that immigrants have a lower probability of engaging in education, shopping and market work (assimilating activities), but conditional on participating, they spend more time in these activities than natives. Zaiceva and Zimmermann (2014) analyze non-market time allocation decisions by native and ethnic minority men and women using the UK Time Use Survey data and find that ethnic minority females in particular spend more time, *ceteris paribus*, on "traditional" activities, such as religious activities and food management. With respect to childcare, they find that, it is gender that matters with men spending less time on childcare than women.

Regarding multitasking, Floro and Miles (2003) employ the 1992 Australian Time Use data, analyse factors that affect multitasking behavior and show, among other results, that immigrants in Australia (those whose primary language is not English) multitask less (see also Section 4.1).

Zaiceva and Zimmermann (2011) focus on multitasking behavior and investigate whether an ethnic divide exists in such behaviour. To this aim, they employ the 2000 UK Time Use Survey data and investigate the determinants of secondary household production and leisure activities. They first show that the incidence of multitasking in general is high, as over 90 percent of the time diaries analyzed reported a positive amount of time spent on secondary activities. Regarding ethnicity, the authors find large differences, as around 94% of whites and only 77% of non-whites reported multitasked behavior on weekdays, and 92% and 79%, respectively, on weekends. In addition, white females were found to "stretch" their time the most by nearly an additional 4 hours per day, while non-white men "stretch" their time the least. They then show that the largest amount of multitasked time is spent on social activities and resting (e.g., socializing with household members or visitors, talking on the phone, visiting other people or places) and passive leisure (reading, watching TV, or listening to the radio, etc.), followed by childcare. Moreover, the descriptive evidence suggests differences by ethnicity for men and women in social activities and passive leisure (with whites spending more time multitasking than non-whites of the same gender), whereas it is gender that matters for childcare. Consistent with the literature, they also find that a large amount of time spent on childcare is in secondary childcare activities, in particular for women. This descriptive evidence is confirmed by the regression results, suggesting that ethnicity matters, *ceteris paribus*, with non-white minorities engaging less and spending fewer minutes in overlapping activities than whites. In addition, heterogeneity is found among ethnic minorities, with Pakistani and Bangladeshi males having the largest gap in total time spent on all secondary activities, *ceteris paribus*.

#### **4.6. Multitasking by Children**

Multitasking also involves costs. As discussed above, apart from psychological costs and increased fatigue and stress, when individuals perform several tasks simultaneously, their productivity can



decline, and the time they need to complete tasks can increase. Multitasking can have particularly negative impacts on children's skills and performance. Suziedelyte (2016) studies the negative effect of multitasking on the noncognitive skills of children. She employs the Child Development Supplement to the US Panel Study of Income Dynamics and addresses the potential endogeneity of multitasking by estimating panel data models. In her study multitasking encompasses doing more than one activity at the same time outside school, work, and sleep time. She shows that 98% of the children in the sample multitask, and more time is spent multitasking on weekends than on weekdays. Passive leisure and travel are activities that involve the most multitasking (i.e. "doing something else at the same time"), but also more than half the time spent on a computer or a cell phone involves performing another activity. Multitasking also occurs during activities that require more attention and focus, such as household chores, socializing, and caring for others, whereas organizational activities, personal care, and studying are multitasked less often. The regressions of the determinants of multitasking behavior indicate that boys multitask less, as do black children, whereas none of the socio-economic characteristics of the family are significant.

Suziedelyte (2016) does not find a negative effect of multitasking on noncognitive skills in general, however, a heterogeneity analysis suggests that multitasking might negatively affect younger children; moreover, multitasking might have a negative effect on noncognitive skills, especially when the brain is performing too many cognitive tasks. The latter finding is confirmed by the negative effect of long hours of multitasking, especially on emotional problems, as well as by the larger negative effect of multitasking on so-called internalizing behavior problems (e.g., being too anxious, unhappy, or depressed, having trouble getting along with other children) on weekdays, which is when the child is engaged more in cognitive activities. Finally, she also finds that multitasking while studying increases so-called externalizing behavior problems (i.e., disturbed and antisocial behavior, such as cheating, being rude, being disobedient or destructive).

Pabilonia (2016) investigates whether media use while doing homework has a negative impact on US school children. To this aim, she employs time diary data from the Child Development Supplement to the US Panel Study of Income Dynamics for 1997-2008. She documents large gender differences in multitasking while doing homework (i.e., when two activities are reported and one of them is homework), with girls being more likely to combine their homework with another activity in general at all school levels. Elementary school students combine approximately one-third of their homework time with other simultaneous activities. The activity combined with homework most often is talking with others, either in person or on the phone, which might not necessarily imply a negative impact on children's performance, because they might simply receive help from their parents or others while doing homework.

Among middle school students, the activities combined most often with homework are watching TV (both genders), listening to music (girls), and talking to others (boys). High school students are more likely to multitask while doing homework than students in lower grades, and high school girls spend around 60% of their homework time performing other activities simultaneously. Among high school students, the activities combined with homework most often are listening to music, watching TV, and talking with others. High school students also spend more time than younger students using computers and mobile phones for pleasure while doing homework. These findings thus imply, as is suggested by Pabilonia (2016), that a possible explanation of the longer time that girls spend on homework is alternating their attention between homework and another activity, such as watching TV. This is in line with the literature on multitasking in the workplace and a general finding that it takes an individual longer to complete tasks when multitasking. Finally, the author also suggests that divided

attention between homework and other activities may have negative consequences for students' academic performance.

## 5. Conclusions

This chapter reviews and presents an exploratory discussion of the relatively sparse but growing economic literature on multitasking in the household. In contrast to studies on multitasking in the workplace, theoretical economic models of household production have started to incorporate multitasking activities only recently. Fewer empirical studies are conducted on multitasking in household production in economics than in other disciplines, in particular, in sociology.

Empirical studies that investigate multitasking in household production usually employ time diary data and consider secondary, or overlapping, activities and “passive” childcare. The addition of these overlapping activities results in a more precise measure of unpaid work within a household, indicating that women's total paid and unpaid work exceeds that of men. Gender, household composition and life cycle, in particular the presence of children, are clearly important determinants of multitasking behavior. Variables, such as education and income, are equally important, as they reflect the opportunity costs of time and bargaining power within the household, in particular, the division of household labor. Employment status and job characteristics are also important, because flexible work arrangements and the opportunity to work from home may influence multitasking behavior. Cultural norms and ethnic background also play a role. This chapter also discusses the implications of multitasking in activities such as childcare, food consumption, remote work, and considers multitasking behavior among ethnic minorities and children.

Further research on multitasking in a household, both theoretical and empirical, is clearly needed. It should analyze additional aspects of multitasked household production activities, including a cross-country perspective. In this context, availability of proper data becomes crucial. Given the unprecedented increase in remote work and closure of schools during the Covid-19 pandemic, multitasking during the pandemic is another avenue for future research. As remote work arrangements, at least to some extent, are likely to remain in the future, implications for time allocation decisions, and in particular, the possibility to multitask some home production activities as well as the effects of such multitasking, gain importance.

Overall, incorporating overlapping activities into the analysis of household production activities allows a more accurate measure of home production. Understanding the determinants, effects, and implications of multitasking in a household is, in turn, important for policy. Recognizing and measuring unpaid household work activities, including those performed simultaneously, would contribute to achieving gender equality and the United Nations' Sustainable Development Goals.

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