

Mothers' Time. Technology, Institutions and the Allocation of Time between Household Activities and Market Work in Sweden during the Short Twentieth Century¹

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Abstract

This paper examines the time-saving effects of modernization of Swedish households and its impact on the time allocation of married women and mothers during the short twentieth century, 1920-1990. It provides some estimates of the amount of time that was saved in different periods by the diffusion of a number of technical improvements in the households. Differences in the allocation of the time saved between different groups of married women is explained within a Heckscher-Ohlin framework by differences in value between time that was locked in households with small children and time available also for market work in households who did not face this impediment to market work. Finally, the role of institutions in moving the dividing line between these two types of households is recognized.

1. Introduction

Technical change has revolutionised household work. To a large extent this development took place during the period treated in this paper, that is from the end of The Great War until around 1990. In 1937 Swedish urban housewives devoted approximately 50 hours per week to housework, childcare excluded (SOU 1947:46). Sixty years later only half of that time was used for such activities.

This period also saw a tremendous increase in the labour force participation of married women and mothers in Sweden. But was there an immediate connection between these two processes? Did married women and mothers enter the labour market because technical progress saved time in housework that then was supplied to the labour market? That is too rash a conclusion. A secular and substantial demand-driven increase in female-to-male relative wages was another feature of the period.

To determine the role of productivity gains in household work for female labour supply requires a detailed analysis of the time patterns of shifts in labour force participation and technical change in homemaking as well as of the connections between the two. This paper provides a basis for such an analysis by examining the temporal pattern of technical change and its effects on time use in Swedish urban households

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during the short twentieth century (1920-1990). It also proposes an interpretation of the observed patterns.

2. Reallocation of time

A number of studies from different countries have demonstrated that there is no straightforward time-reducing effect on household work from the introduction of household appliances. Vanek (1974) found that American housewives rather increased than decreased the time devoted to household production as new and more efficient technologies were introduced. In a book with the suggestive title “More Work for Mothers” (1983), Ruth Cowan-Schwartz presented a similar conclusion. The results were by Mokyr (2000) referred to as “the Cowan problem”. He suggested that the increase in volume of household work in the period 1870-1945 may be explained by a shift of the utility function of the household. New knowledge about the importance of hygiene and cleanliness for the long-term well-being of family members, particularly children, increased the utility of household work such as laundry and cleaning.

Other authors have been more hesitant to draw as strong conclusions as Vanek and Cowan-Schwartz about the evolution of unpaid work but have pointed in the same direction. In a broad international comparative time-budget study on data collected for twelve countries during the latter half of the 1960s the authors came to the following conclusion: “There is little sign, however, that gains from an abundant labour-saving technology receive much translation into leisure. Variations in time devoted to household obligations across our sites are not spectacularly large” (Robinson et al. 1972:125).

Robinson et al. documented strong differences between employed women and housewives, indicating that there was a potential time-saving effect from new household technologies. Studies of Swedish household work demonstrated a similar pattern (see Boalt 1983:60). The time used for household work by homemakers was not significantly reduced until the 1970s, while gainfully employed women exploited the timesaving potential of the progress in household technologies at least from the 1950s (Boalt 1983:51; Nyberg 1989: 238). Was there a Cowan problem in Sweden too?

This paper aims at making a contribution to this discussion by posing, and proposing some answers to, questions such as: How much time was saved by improvements in household technologies? When did this occur? What use did married women and mothers make of the potential time saved and how can the choices that were made be explained? The following section presents some new estimates that may be part of an answer to the first two questions. The analysis covers urban households during the period 1923-1990. 1923 is taken as the starting point because sufficiently good data on the diffusion of household technologies are available from then on. 1990 is taken as the closing date because labour force survey data indicate that the process of shifting out labour from households to the market had been completed by then. Some of the surveys cover urban households only. This means that series of observations that are reasonably close in time can only be constructed for this type of households. This is a drawback, which however is, at least partly, neutralised by the fact that an essential part of the issue dealt with here concerns female labour force participation and thereby does not include rural farm households.

3. Time saved

Estimates of potential time saved as a result of the introduction of new household technologies are based on two types of data. One is information about the proportion of households with access to certain technologies at different points of time. Such information can be derived from a number of surveys on living conditions, the first dating from 1923. The other type of data is information about the timesaving properties of these technologies. Such information is rarely directly available, which means that calculations have to be based on a combination of scattered information from reports of various kinds and some reasonable assumptions.

The potential time saved is calculated as the average amount of time that would have been saved by urban households, if all the efficiency gains from introducing new technologies in the household had been used to reduce the input of time while keeping output of goods and services constant. The following technologies are included in the estimates:

Running water and sewage
Central heating
Gas stoves and electric cookers
Vacuum cleaners
Electric washing machines
Dish washers

The absence on the list of some wide-spread facilities needs to be briefly commented. Sewing machines were common in all social groups and had entered about 90 per cent of all households in 1941, when the first quantitative information appears. Qualitative data indicate that they were widespread already before the First World War (Nyberg 1989: 82). However, sewing machines were not time-saving in the sense the concept is used here – rather the opposite, because home-made clothing was not a substitute for more labour-intensive production in the household, but rather for industrially manufactured clothing purchased in the market.²

Refrigerators were rapidly introduced in Swedish households after World War II, and in 1970 over 90 per cent of the dwellings were equipped with such conveniences. Freezers came later but spread rapidly from 5 per cent of the households in 1958 to 45 per cent in 1971 and 90 per cent in 1990. However, the time saved seems to have been insignificant. The number of shopping occasions for Swedish households stayed constant from the 1930s and well into the 1980s (ibid.:219). My conclusion is that refrigerators and freezers primarily had a direct impact on the quality of household production but not on the allocation of time, simply because there was no time-saving potential to be exploited.

Micro wave ovens have lately been introduced on a large scale, but this is a process which largely falls out of the time span of this study.

² Bowen and Offer (1994) include time-saving as well as time-using durables in their study, which however addresses a slightly different question than the one treated here: how time at the disposal of households was used.

3. a. Diffusion of household technologies

Table 1. Swedish urban households with access to various household technologies, 1923-1990 (in %)

	<i>Vacuum cleaner</i>	<i>El. washing Machine</i>	<i>Cooker (el or gas)</i>	<i>Water and Sewage</i>	<i>Central heating</i>	<i>Dish-washer</i>
1923	-	-	40	71	3	-
1933	25	-	51	79	35	-
1941	43	-	70	85	50	-
1948	55	1	76	88	67	-
1952	61	8	79	99	70	-
1958	74	13	83	100	75	-
1971	89	38	92	100	78	5
1975*	100	65	100	100	87	18
1980*	100	69	100	100	93	30
1985*	100	73	100	100	100	37
1990*	100	75	100	100	100	44

Sources: The Swedish Social Welfare Board, Cost of living surveys (1929, 1938, 1943, 1953, 1956, 1961); Statistics Sweden, Living conditions (1975, 1985, 1993)

Table 1 reports the proportion of urban households with access to the different technologies included in the analysis 1923-1990. It reveals a process of gradual modernization of Swedish housing standard. Running water and sewage were available to more than two thirds of urban households already in the early 1920s and to practically all urban households around 1950. Gas stoves and electrical cookers as well as central heating were introduced a bit later.

Electricity was available to practically all urban households already in the early 1920s. 98 per cent of urban dwellings were equipped with electric lighting in 1923 (Levnadskostnaderna 1923: Table S, p. 53). Electrical household appliances were not, however, widely diffused before World War II. The vacuum cleaner, which had been acquired by a good half of Swedish households by the end of the World War II, was an exception. The electrical washing machine slowly entered Swedish homes after the war but was still missing in the majority of households in the early 1970s. The rapid diffusion that followed during the 1970s and 1980s can be explained by a conjuncture of factors. Improvement of the technology coincided with a fall in relative prices and a rise in real income. The price of a standard washing machine increased with a factor 3.4 from 1970 to 1990, while the consumer price index increased fivefold during the same period (Statistiska meddelanden P 1970-1990).

Dish washers, finally, were most rapidly diffused during the 1970s. The proportion of households with an electric dish washer increased from 5 per cent in 1971 to 30 per cent in 1980 and then at a somewhat slower pace to 44 per cent in 1990.

3. b. Time-saving properties of household technologies

Table 1 demonstrates a broad and continuous introduction of new household technologies over the entire period of our study. This information alone does not, however, tell anything about the effects in terms of the time saved. To provide the basis of any

conclusions about that it has to be combined with data on the time-saving properties of each specific technology.

A number of more or less detailed studies of time use in household work have been carried out in different contexts and with a variety of methods. Boalt (1983:59) lists seven studies that were performed between 1937 and 1976. In 1990/91 and in 2000 Statistics Sweden accomplished extensive time use surveys (Statistics Sweden 1992 and 2003). The quality of some of the data presented in these studies, particularly the early ones, is debatable. Moreover, since they do not always provide exactly the type of information that fits our purposes, they have to be combined with appropriate assumptions and speculative reasoning to be useful. That said, I would still maintain that the estimates that have been based on these data add considerably to our knowledge with respect to the order of magnitude as well as the temporal pattern of change in time requirements for a set tasks in household service production.

It is clear that apart from child care, which is excluded from the estimates, cooking and cleaning were the two most time consuming pieces of housework in the 1930s; and so they have remained until the present (Boalt 1983:57-62; Statistics Sweden 1992:90-91).

The installation of running water and sewage reduced the amount of time used for household work as well as increases its quality, particularly in terms of hygienic standard. There is a piece of information dating from the late 1930s about the timesaving effects of these technologies. A time study covering household work on small farms, which lacked water and sewage indoors, came to the conclusion that women in these households devoted on average nearly 14 minutes per day to bringing in water and getting rid of slops (SOU 1939:6, Table 4). It is reasonable to assume that this kind of work was at least as time-consuming in urban households, where often more stairs had to be mounted and descended than on a farm. It also seems reasonable to add a couple of minutes per day due to the fact that access to water positively affected the efficiency of other types of household work. This would add up to a time reduction of minimum 20 minutes per day or 140 minutes per week as a reasonable estimate.

As gas stoves and electric cookers replaced wood stoves, the laborious task of handling the wood that was required for cooking and heating of water was eliminated. Again, information about the amount of time used for these tasks is based on observations of farm households. In 1938 14 minutes per day were required for lighting and keeping fire in the stoves for cooking purposes (SOU 1939:6, Table B). I assume that handling and bringing in wood for the stove was about as time consuming as handling water and sewage, that is roughly a quarter of an hour per day. This adds up to a total of around half an hour per day or 210 minutes per week. None of this work had to be carried out in households where electric stoves or gas cookers had been installed, so the potential time saved equals the time used.

The timesaving property of central heating is similar to that of electric cookers and gas stoves. It is, however, reasonable to assume a scale effect in the handling of wood. A household equipped with wood stove and no central heating could probably save some time by combining tasks for both activities. I assume that handling and bringing in fuel basically required the same amount of time for heating as for cooking, that is 15 minutes per day for each one of the two tasks. I also assume that the task could be carried out for both heating and cooking in three quarters of that time, that is in 22.5 minutes.

The scale effect only applied to households that lacked both central heating and gas stove or electric cooker. The introduction of central heating lagged behind the introduction of modern cookers. For the sake of simplicity I therefore assume that modern cookers were introduced in individual households either before or at the same time as the installation of central heating. This means that as cookers were installed the scale effect disappeared and the time reduction for handling fuel can be estimated to $30 - 22.5 = 7.5$ minutes per day or 52.5 minutes per week, while the timed reduction from the installation of central heating amounted to 15 minutes per day or 105 minutes per week. To this shall be added the time needed to light and keep fire, which was 15 minutes per day for cooking. I assume that the equivalent for heating purposes was a bit less, say 10 minutes. This adds up to a time reduction effect of 157.5 minutes per week for modern cookers and 175 minutes per week for central heating.

There is no direct information available about the time-saving potential of the vacuum cleaner. It is unlikely that the effect should amount to less than 20 per cent of the total time spent on cleaning – my guess is rather somewhat more than that. According to a survey from the late 1930s 14 hours per week was spent on cleaning (SOU 1947:46, Table 2). 20 per cent of that means 168 minutes, which justifies the assumption of a reduction of 180 minutes per week.

Just as in the case of vacuum cleaners there is no direct information on the timesaving effect of the introduction of electric washing machines. We know that homemakers spent as much time on laundry in 1964 as in 1937 (Boalt 1983:60) but we also know that a larger volume was processed in the latter year (Cronberg 1987:63). The washing machine probably saved more effort than time until the automatic machines appeared in the 1960s. Until then a washing machine had to be continuously tended. It had to be replenished with and emptied from water and the laundry had to be put in a separate wringer or spin-dryer. Of course there was a time-saving effect, since time between these moments of work could be used for other activities. A reasonable lower estimate of time saved may be 40 per cent, which would amount to 144 minutes per week. Automatic washing machines not only relieved the homemaker from the constraint of being present during the washing process but must also have saved time. A reasonable guesstimate is an additional 25 per cent, which means 65 per cent or 234 minutes per week in total.

Dish washing was a time consuming activity before the introduction of the electric dish-washer. Surveys from the 1930s through the 1960s report variations between 5 and 8 hours per week. A survey from 1957 indicates that the difference in time use between homemakers and gainfully employed women was not significant. Homemakers used 8 hours per week, part-time employed women 7 hours, and full time employed women 5 hours a day. There are indications that the lower figure for full-time employed to some extent mirrors a contribution by husbands. Of all household tasks dish-washing was at the time the one to which husbands, and children for that matter, contributed the most (Boalt 1983:49).

Automatic dishwashers that were introduced and diffused only from the early 1980s are very time efficient. The difference between washing the dishes and just filling and emptying the washer is substantial and at a guess brought a reduction of the time used of at least two thirds. From an average of 6 hours per week this would mean a reduction of 240 minutes per week. The models of the 1970s were less efficient and I

assume that these brought a reduction of only 50 per cent, which means 180 minutes per week.

Table 2. Time saved from technological improvements in households. Minutes per week.

	<i>Vacuum cleaner</i>	<i>El. washing Machine</i>	<i>Cooker (el or gas)</i>	<i>Water and Sewage</i>	<i>Central heating</i>	<i>Dish-washer</i>
1923			157.5	105	175	
1933	180		157.5	105	175	
1941	180	144	157.5	105	175	
1948	180	144	157.5	105	175	
1952	180	144	157.5	105	175	
1958	180	144	157.5	105	175	
1971	180	234	157.5	105	175	180
1975*	180	234	157.5	105	175	180
1980*	180	234	157.5	105	175	240
1985*	180	234	157.5	105	175	240
1990*	180	234	157.5	105	175	240

Sources: See text.

Table 2 summarizes the results of the reasoning above. These are then combined with the data on the time pattern of diffusion reported earlier in table 1 and transformed to changes per period in table 3. The periods are demarcated by the years when the surveys from which information has been collected were accomplished.

Table 3. Change in the proportion of urban households that had access to technological resources in Sweden 1923-1990. Percentage points.

	<i>Vacuum cleaner</i>	<i>El. washing machine</i>	<i>Cooker (el or gas)</i>	<i>Water and Sewage</i>	<i>Central heating</i>	<i>Dish-washer</i>
1923-33	20	0	11	8	32	0
1933-41	12	0	19	6	15	0
1941-48	23	1	6	3	17	0
1948-52	6	7	3	4	3	0
1952-58	13	5	4	9	5	0
1958-71	15	25	9	8	3	5
1971-75	11	17	8	0	9	13
1975-80	0	9	0	0	6	12
1980-85	0	7	0	0	7	7
1985-90	0	0	0	0	0	7

Sources: See table 1

3. c. Estimates of time saved

Multiplying Table 2 into Table 3 gives the average potential time saved by urban households as a result of the diffusion of the household technologies included in the analysis. The result of the calculation is reported in Table 4. Table 5 reports the annual change in different periods and the accumulated savings at the end of the periods.

Table 4. Average potential time saved in Swedish urban households due to the use of technological resources 1923-1990. Minutes per week.

	<i>Vacuum cleaner</i>	<i>El. washing machine</i>	<i>Cooker (el or gas)</i>	<i>Water and Sewage</i>	<i>Central heating</i>	<i>Dish-washer</i>
1923-33	36	0	17	8	56	0
1933-41	22	0	30	6	26	0
1941-48	41	1	9	3	30	0
1948-52	11	10	5	12	5	0
1952-58	23	7	6	1	9	0
1958-71	27	59	14	0	5	9
1971-75	20	40	13	0	16	23
1975-80	0	21	0	0	11	29
1980-85	0	16	0	0	12	17
1985-90	0	0	0	0	0	17

Sources: See table 1!

Table 5 Time saved due to the use of technological resources in Swedish households 1923-1990. Average annual change per period (minutes per week) and accumulated change at the end of the periods (hours per week).

	<i>Annual Change</i>	<i>Accumulated change</i>
1923-33	12	2.0
1933-41	11	3.4
1941-48	12	4.,8
1948-52	11	5.5
1952-58	8	6.3
1958-71	9	8.2
1971-75	28	10.0
1975-80	12	11.1
1980-85	9	11.8
1985-90	3	12.1

Sources: See table 1!

In table 6 and in figures 1 and 2 the estimates are presented in periods of about a decade each.

Table 6 Time saved due to the use of technological resources in Swedish households 1923-1990. Average annual change per period (minutes per week) and accumulated change at the end of the periods (hours per week).

	<i>Annual change</i>	<i>Accumulated change</i>
1923-33	12	2.0
1933-41	11	3.4
1941-52	11	5.5
1952-58	8	6.3
1958-71	10	8.2
1971-80	18	11.1
1980-90	6	12..1

Sources: See table 1!

Figure 1 Average annual change in time saved due to the use of technological resources in Swedish households 1923-1990, minutes per week.

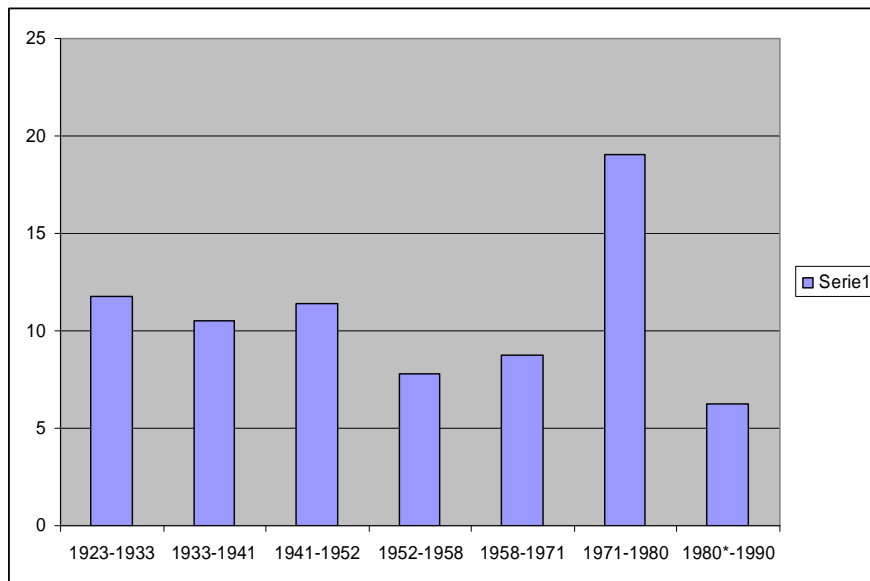


Figure 2 Accumulated change in time saved due to the use of technological resources in Swedish households 1923-1990, hours per week.

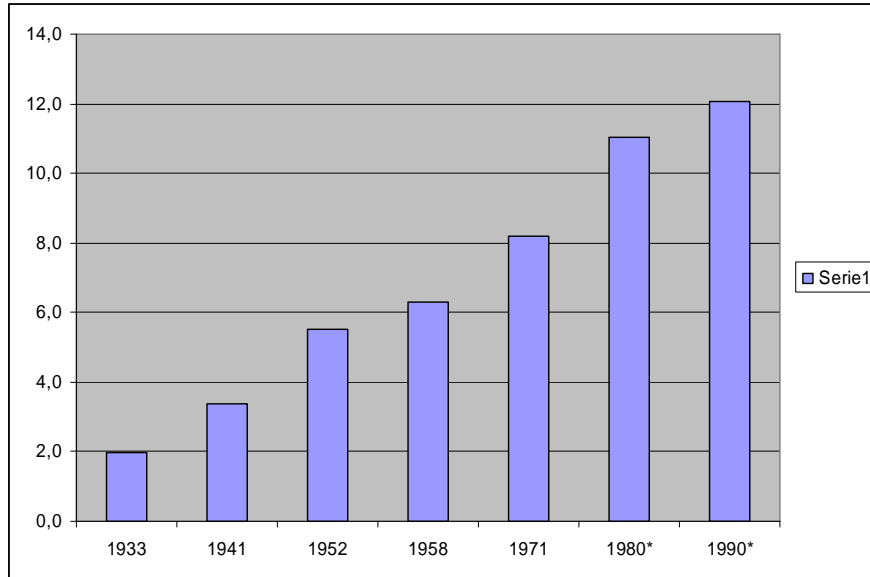


Table 5 and figures 1 and 2 demonstrate that the potential time-saving effects of new technologies varied within a rather narrow span of 8 and 12 minutes per week annually until the 1970s, when the effect more or less doubled. The amount of time saved is not impressive. The accumulated saving in 1958 was just above 6 hours per week and in 1990 just above 12 hours per week. Even if the estimate, which of course is marred with a high degree of uncertainty, probably is downward biased the result still serves to play down the quantitative impact of these technological changes in household work – at least until the 1970s.

Technical change may have affected time allocation of households also through the market for goods and services. Productivity growth in production of consumer goods may for instance have altered the marginal value of time devoted to activities such as cooking and sewing

There was an average increase in the purchase of ready-made clothing of 7.5 per cent per year between 1931 and 1950, of 4 per cent per year between 1951 and 1970 and of 2.5 per cent per year from 1970 to 1985 (Bentzel 1957, *Table C:III*, Dahlman and Klevmarken 1971, *Table B:16*, Statistical Reports N 10 SM 8601, *Table 1:2*). This probably reflects not only an increase in consumption of clothing but also to some degree that products purchased in the market replaced home made clothes.³ In 1956 homemakers devoted 8 hours per week to sewing compared to only 2 hours for fulltime employed

³ Strangely enough it seems as if home production was highly competitive in this field during the period when the process substitution seems to have started. In the mid-1940s the hourly “wage” in home production of clothes was between 1 and 1.5 kronor (SOU 1947:46:89). The female blue-collar wage in the clothing industry was 1.26 in 1945 (Lönestatistik årsbok 1945). This probably changed as female wages increased and prices of ready-made clothing fell.

married women. The difference indicates that there was time to be saved from purchasing ready made clothing.

Food consumption increased by almost 40 per cent between 1935 and 1950 (Bentzel 1957:8). This was not the result of an increased intake of calories but of a shift in the composition of the food, notably a transferring of consumption to more refined products. The volume of flour purchased decreased by 50 per cent between 1931 and 1955, while the volume of bread increased by 100 per cent in the same period (ibid. *Table C:1*). According to a public report from 1946 some fifty per cent of urban households baked their own bread regularly and another forty per cent did so occasionally. Calculations made for the report indicated, however, that this was not a very remunerative activity when compared to purchasing bread in the market (SOU 1947:46:82) - in contrast to most other types of food preparation. The report concluded that the price of ready-to-eat food was generally far above the cost of a home produced alternative even when labour costs at market wages were included ((SOU 1947:46:74).

Production in the canning industry grew from 15.000 tons in 1930 to 35.000 in 1940, 60.000 in 1950 and 100.000 tons in 1960 (Sveriges industri 1961:509). The bulk of this was canned fish, but very few of the products that were available – at least before World War II - seem to have been the basis of full meals. According to the report referred to above the products were too expensive to enter the fare of the normal household. The only exception was canned fish-balls (SOU 1947:46:78).

To conclude, at least until after World War II bread was the only industrially produced food of any importance that was consumed by Swedish households. In the years to come increased availability and subsidising of meals outside the home was probably more important. This did not only reduce the time that had to be devoted to cooking in the household. It was above all compatible with a two-earner system where all adults are absent during day time.

Free lunches were introduced in Swedish schools in the 1940s. The number of pupils with access to this public sector good increased from 140,000 in the school year 1946/47 to 950,000 in 1966/67, which is equivalent to 90 per cent of all pupils (Elg et al. 1987:128). In 1968 400.000 subsidised meals were served in company canteens. In the early 1980s 1.2 million people had access to subsidised lunch in canteens or in ordinary restaurants (ibid.:129). This was also the time when ready-to-eat food compatible with micro-wave ovens entered the market, but this is process that falls outside the time span of this paper.

The amount of time that was saved by transferring food preparation to the market is difficult to estimate. The effect seems to have been primarily confined to the period from the late 1960s onwards and consequently served to re-enforce pattern of time saved from improvements in household technologies demonstrated in figures 1 and 2 as it adds to the already large time-saving effect that has been estimated for the 1970s .

4. Time allocation effects

Models of time allocation usually consider three areas to which households devote their time: market work, household production and leisure. Time saved due to changes in household technologies can be used to increase the amount of labour supplied to the labour market, to increase the volume of household services, and to increase leisure.

As stated in the introduction to the paper, the short twentieth century was a period of considerable positive shifts in the labour force participation of married women and women with small children. However, the temporal co-variation between female labour force participation and the potential time saved in homemaking does not appear to be strong.

Table 7. Labour force participation rates for Swedish women 1920-2001.

A. Gainfully employed Swedish women 16-64, 1920-1965, per cent

	<i>All women</i>	<i>Married women</i>
1920	26.9	3.8
1930	30.7	8.0
1940	29.3	9.3
1945	28.0	10.1
1950	29.5	14.1
1960	32.0	23.3
1965	35.0	29.9

Source: Silenstam (1970:105)

B. Labour force participation rates for Swedish women 16-64, 1965-2000, per cent

	<i>All women</i>	<i>Married women</i>	<i>Women with children 0-6</i>
1965	53.8	47.2	36.8
1970	59.3	56.1	49.7
1975	67.9	66.2	60.5
1980	75.2	75.6	75.4
1985	79.2	82.0	84.0
1990	82.3	NA	86.3
1995	76.1	NA	79.3
2000	75.5	NA	79.7

C. At-work rates for Swedish women 16-64, 1965-2000, per cent

	<i>Married women</i>	<i>Women with children 0-6</i>
1965	40.8	29.5
1970	48.2	40.4
1975	54.4	44.4
1980	58.5	50.1
1985	64.2	54.9
1990	NA	54.0
1995	NA	55.0
2000	NA	56.1

Source: Swedish Labour Force Survey

Data on time allocation within households disaggregated on labour market status of the female members are available from the mid 1950s. A number of surveys have been accomplished since then, and although the data are not entirely consistent they allow us to sketch a broad picture of the development from 1956 to 1990. In 1956 housewives used about 35 per cent more time for homemaking than fulltime employed married women (Boalt 1983:48). In absolute terms, there was only a slight reduction for housewives until the mid-1960s, while gainfully employed women continued to cut down on household work (ibid.:51).

Obviously, married women who entered the labour market exploited the potential to reduce the time devoted to housework. And from around 1970 technological progress seems to have an impact also on the time allocation of homemakers as they significantly reduced the time used for household activities until 1976 (Nyberg 1989: 238). The 1976 survey did not cover gainfully employed women. A detailed time use survey conducted by Statistics Sweden in 1990 reported a 35 per cent gap between full time employed and non-employed women. Thus the difference between the two groups increased from the 1950s through the 1960s, decreased during the 1970s and eventually returned to a ratio of two-to-three in 1990 (Statistics Sweden 1992:61).

The general pattern is reflected in survey data on time used for laundry. Four surveys accomplished between 1937 and 1964 reported a fairly constant time use of between six and seven hours per week for homemakers, while a survey from 1976 reports only 3.5 hours per week. Full time employed women, for whom there is information only from two surveys in 1956 and 1964, use only about half as much time for laundry as homemakers.

This demonstrates that women who entered the labour market used the potential time saved due to technical progress to increase the supply of labour from the household to the market, while the women who did not leave the home for the labour market increased their supply of household services. In order to explain these different behaviours we need to know who entered the labour market and who stayed in the home, and why.

4. a. *Married women in the household and in the labour market 1945-1965*

Female participation rates did not change much between 1920 and 1945. And although married women increased their gainful employment to some extent during the 1920s, only 10 per cent were employed in 1945.

From the end of World War II substantially more women, and particularly married women, entered the labour market. The increase may not seem impressive on the aggregate level. The two decades between 1945 and 1965 saw an increase in the female participation rate from 28 to 35 per cent, but this was entirely due to a positive shift in gainful employment of *married* women, which increased their labour force participation threefold from ten to thirty per cent in twenty years. Basically and on a general level of analysis the increase in participation rates was driven by a substantial rise in female relative wages in the second half of the 1940s (Svensson 1995:97).

Table 8 Age specific labour force participation rates for married Swedish women 1945 and 1965.

	<i>15-19</i>	<i>20-24</i>	<i>25-29</i>	<i>30-39</i>	<i>40-49</i>	<i>50-59</i>	<i>60-64</i>	<i>15- 64</i>
1945	15.4	17.9	15.2	11.7	10.7	6.6	3.1	10.1
1965	29.4	37.8	32.4	34.3	39.3	30.5	14.7	29.9

Source: Silenstam 1970:105

The process exhibited a distinct age pattern. The magnitude of the change increased significantly with age and brought a shift in the age pattern of gainful employment among married women. Table 8 shows that the participation rate peaked at the age of 20-24 in 1945, while in 1965 the highest rate was among women 40-49.

Among married women aged 15-24 years the increase in participation rate was considerably larger in 1945-1950 than in the 1950s, indicating an immediate reaction to the relative wage shift in the 1940s. For women aged 25 years and more the changes were more moderate. Moreover, for this age group the shift was greater after 1950, when relative wages were stationary, than between 1945 and 1950.

This is consistent with the conclusions in Svensson (1995:108-111). A detailed examination of age-specific shifts in female labour force participation 1945-1960 provided support for the hypothesis that shifts in labour force participation were connected with shifts in fertility behaviour.

Female relative wages increased rapidly in the latter half of the 1940s but remained stationary during the 1950s. However, the growth in labour force participation of married women was somewhat stronger in the 1950s than in the period 1945-1950. There seems to have been a delay in the reaction to rising female relative wages, and the presence of small children in the household was probably an important factor behind this frictional resistance.

Results from American studies of female labour supply, which show that the elasticity of supply with respect to the female wage is lower for women 25-34 than for other age groups, lend support to this interpretation. Mincer (1962) concluded, and the argument was repeated by Schultz (1980), that maternal care of small children is more difficult to find substitutes for than other forms of household work. The presence of small children in the household consequently constitutes the most important impediment to married women's labour market entry (Schultz 1980:80).

In the context of this paper it means that households with small children were barred from supplying the time that could be saved by technological change in household production to the labour market. The question who entered the labour market and who stayed in the home may then be given an answer. Women with small children stayed in the home and women who entered the labour market did not have small children.

A substantial part of the women who stayed in the home did so because their small child was a definite impediment to labour market entry. This means that time saved due to technological progress could only be used to increase the quantity and quality of household services or to increase leisure time. Consequently, their alternative cost of providing more or better household services was the cost (utility) of leisure, while for women who had the possibility to enter the labour market the alternative cost was the market wage.

In other words, married women's time was valued differently depending upon whether it could be moved to the labour market or it was locked in the household. According to the Heckscher-Ohlin theorem the value of a relatively abundant locked in factor increases with market integration. Applied to the problem discussed here the theorem suggests that the value of time that could be moved to the labour market exceeded the value of time that remained locked in the household. As a consequence the alternative cost of producing household services was lower for women with small children than for other married women, which made homemakers produce a higher volume of such services.

Data on differences in time devoted to sewing in households of homemakers and of gainfully employed women lends further support to this interpretation. In the mid-1950s homemakers devoted eight hours per week to sewing compared to two hours for gainfully employed married women (Boalt 1983:61). Women who were able to supply time to the labour market cut down on time for sewing, because the alternative cost was too high for it to be rational. Women who did not have this opportunity used sewing as a way to substitute abundant and low-value time for goods.

4. b. Women in the household and in the labour market 1965-1990

The years around 1970 brought great changes in family life in Sweden. One such change was a sharp decline in the marriage rate. The number of marriages decreased by 40 per cent from the mid-1960s to the late 1970s (Statistical Abstracts of Sweden 1983: 42). It signified a shift from marriage to co-habitation which makes "married women" a somewhat obsolete analytical concept. This is why this section instead makes use of the category "women with children". Institutional changes, notably the introduction of separate taxation and a rapid expansion of public and heavily subsidized day care, together with a continuous excess demand for female labour triggered a further leap in female participation rates.

In the context of this paper we have noted a decrease in the time devoted to household work also for women who were not gainfully employed between the mid 1960s and the mid 1970s. The time use survey that was accomplished in 1976 reported significantly less time devoted to household work by homemakers than in the mid-1960s, and a significantly decrease in the difference to gainfully employed women. Women who stayed in the home took advantage of the technical progress and reduced the amount of labour put into production of household services. I shall propose an explanation of this development along the same line as was proposed above for the period 1945-1965.

Two important changes occurred in the 1970s. First, there was a leap in the effect on time saved due to technical progress in household work. The accumulated savings increased by thirty-five per cent from eight to eleven hours per week between 1971 and 1980. Moreover, some technologies such as the automatic and later the electronic washing machine, and some services provided by the market or the public sector, such as free or subsidized lunches, were highly compatible with the two-earner household.

Second, it was argued above that a significant fraction of the women who stayed in the home cared for small children. Before the expansion of public day care this was probably equal to pre-school children. With the development of public and subsidised

day care during the 1970s and 1980s the meaning of *small* shifted downwards, and the average age of children cared for in the homes decreased.

This is supported by data on changes in participation rates and particularly on at-work-rates disaggregated on age of children and mothers. At-work-rate of mothers with children 7-17 increased from 50 to 70 per cent between 1965 and 1980. In 1980 differences with respect to mothers' age were very small within this group. During the same period at-work-rate of mothers with children 0-7 increased from 30 to 50 per cent, that is also by 20 percentage points. However, there were large differences with respect to mothers' age, and in 1980 at-work rate of mothers aged 20-24 was fifteen percentage points below that of mothers aged 35-44. This was probably because the children of the latter age group tended towards the upper limit of the age span 0-7 and were to a greater extent enrolled in public day care, while children of the former group tended towards the lower limit and were still too young for public day care.

The 1970s brought a shift not only in behaviour – families increasingly used public day care – but also in mental orientation. Family policy reforms, notably publicly provided day care and parental leave legislation and insurance, paved the way for a two-wage-earner system. Between 1970 and 1985 enrollment rate in public day care increased from 10 to almost 50 per cent of children age 0-6.

But alongside the physical expansion of capacity, a process was going on which might be called an ideological offensive, the importance of which, if not its deliberate intention, was to reduce the emotional resistance against leaving children in local authority day care (Svensson 1995:57). Attitudes to this question changed greatly between the 1950s and the early 1980s (Moquist and Kallos 1994:17).

When put together in the analysis these two factors – the leap in time saved as a result of technical change and the downward shift in the average age of children cared for in the homes – may provide an explanation for the observed reduction in time devoted to household work by homemakers. The leap in time saved may have in itself caused a situation where production of household services ran into diminishing returns. A further increase in quantity or quality of these services may not have added substantially to the utility of the household. And production of goods such as clothes and bread within the household became increasingly unprofitable as a result of rise in productivity and fall in prices in the market. This means that the alternative cost of these mothers' time fell.

A possible outcome would be a transfer of time from household work to leisure. However, it is not too far-fetched to imagine that mothers with small children, who they shortly were going to leave in local authority day care, instead took the opportunity to increase the amount of time devoted to child care. In fact, this is exactly what the data reveal. A number of surveys ranging from 1937 to 1964 report a fairly constant time use for non-participating women's care of small children of about two hours per day. The time use survey of 1990 reports 29 hours per week, that is a bit more than four hours per day.

5. Conclusions

Technical change and modernization in Swedish households had a continuous time-saving effect on household work at least from the 1920s. The effect was modest until around 1970, when both quantity and quality of change prompted a leap in the amount of

time saved. In addition tax reform and family policy brought institutional change that promoted a shift to two-earner families. A prominent feature was the expansion of public day care, which removed the most effective impediment to labour force participation for mothers: caring of small children.

The modest time-saving effect before the 1970s was nevertheless exploited by women who left the home for the labour market. A difference developed between homemakers and gainfully employed married women with respect to time devoted for household work. Homemakers increased the quantity and quality of household services. My analysis suggests that presence of pre-school children in the household was an important factor behind the decision to stay in the home. Since this meant that time saved by modernization of the household was locked in the household, the alternative labour cost of household production was low which favoured a high volume of household services.

The leap in the time-saving effect of modern equipment in the 1970s made household production run into diminishing returns, which brought the alternative cost of time use for other purposes down. At the same time the expansion of public day care triggered labour force participation of mothers with pre-school children and brought a fall in the average age of children cared for in their home. The time that their mothers saved by introducing more household appliances was still locked in the household. The time allocation decision between household production facing diminishing returns, leisure or childcare resulted in a doubling of the time devoted to childcare.

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