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Women, Children and the Calculation of Labour Productivity in Europe and North America

Abstract. Economic historians have viewed increases in agricultural labour productivity as one of the key factors behind the shift from an agrarian to an industrial economy. It allowed rural regions to « release » workers for the factory. Jan De Vries suggested that in the XVIIth and XVIIIth century, women and children may have been the workers whose productivity increased the most. This made women and children central agents in the process of economic transformation.

However, calculating labour productivity is fraught with difficulties and the problems are worse in the case of women and children's productivity. Some of the assumptions underpinning the calculations of economic historians are more fragile when applied to women and children than to men. Economic historians have at times assumed that censuses provided reasonably accurate estimates of the size of the labour force ; that the participation rates were uniform within the different categories, and that women and children were as free as men responded to the incentives of the market. All those proved false, and this should incite researchers to extreme caution.

Résumé. Le travail des femmes et des enfants et le calcul de la productivité du travail en Europe et en Amérique du Nord. D'après les historiens économistes, l'accroissement de la productivité du travail dans le domaine de l'agriculture fut un des facteurs essentiels du passage d'une économie agraire à une économie industrielle. Il permit aux régions rurales de « libérer » des travailleurs pour les usines. Jan De Vries a suggéré, en outre, que c'est la productivité des femmes et des enfants qui aurait le plus augmenté, au cours des XVII^e et XVIII^e siècles. Cette main d'œuvre aurait donc joué un rôle clé dans ce processus d'évolution économique.

Toutefois, le calcul de la productivité du travail est semé d'embûches et c'est encore plus vrai dans le cas de celle des femmes et des enfants. Certains présupposés qui soutiennent les évaluations des historiens et des économistes sont plus fragiles dans le cas de ces deux catégories que dans celui des hommes. Les uns et les autres ont tour à tour supposé que les recensements comptaient les travailleurs de manière raisonnablement exacte, que le taux de participation des différentes catégories était uniforme et que les femmes et les enfants étaient aussi libres que les hommes de répondre aux incitations du marché du travail. Or tous ces présupposés se sont révélés faux, et ceci doit engager le chercheur à une extrême prudence.

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Agricultural productivity causes no end of difficulties to a historian of women who ventures into the field of economic history to try to gain a reasonably accurate picture of the contribution of farm women to rural and household economies. The nature and importance of that role can be quite elusive – and the same turns out to be true for children as well.

Earlier research (in English) on European agricultural productivity since the eighteenth century focussed primarily on England, and on land productivity ¹. And the composition of the labour force seems unimportant when one is really interested in the behaviour of yields/acres. Land productivity was estimated to try to understand larger issues, which also seemed to have little to do with the composition of the labour force and the role of women and children in rural societies and economies. What was the timing of land productivity growth in England ; what was the impact of enclosure and technological changes ; and ultimately when did English agriculture become able to keep up with population growth, and thus allow the country to escape the « Malthusian trap » ? Studies of land productivity in the rest of Europe are much fewer in number. What exists tends to implicitly or explicitly compare two regions, and more particularly another part of Europe to England.

1. Labour productivity and agricultural growth

More recent work though has tried to estimate labour productivity either in addition to land productivity, or by itself. Some even attempted total factor productivity (which is not consistently defined). Historians of England wanted to know when and how English agriculture became able to release workers for manufacturing work, thereby making the industrial revolution possible ². They reached the conclusion that labour productivity increased early. Gregory Clark for instance identified two phases in the agricultural revolution. The first, which had ended before 1600, witnessed an increase in output per worker, whereas the second phase (1650-1850) was also characterized by increases in output per acres ³. G. Craft, for his part, suggested that in the eighteenth century, output per worker increased, but not output per worker per hour ⁴. Workers, in other words, worked

1. CHORLEY, G.P.H., 1981 ; TURNER, M., 1982 & 1986 ; OVERTON, M., 1979 and 1984 ; CLARK, G., 1987 and 1991a ; ALLEN, R.C., 1982, 1988b and 1992.

2. DAVID, P., 1970 ; WRIGLEY, E.A., 1985 ; ALLEN, R.C., 1988b and 1992 ; OVERTON, M., 1996, ch. 3, pp. 63-132.

3. CLARK, G., 1991b.

4. CRAFT, N.F.R., 1980.

longer hours or more days per year. Scholars focussing on other countries usually want to know whether other agricultures lagged behind the English one : Patrick O'Brien and Gianni Toniolo compared Italy and England ; Philip T. Hoffman, France and England ; George Grantham, France, England and the United States, Gregory Clark and John Komlos, Great Britain, the United States and Eastern Europe. Peter Solar and Martine Goosens on the other hand compared Flanders and Ireland ⁵.

As far as England is concerned, political economists corroborate the conclusions of the cliometricians. A strange phenomenon puzzled Jan de Vries ⁶. In the eighteenth century, individual real wages stagnated. Nonetheless, social and cultural historians have been able to document the emergence of a consumer society : people were buying more and more perishable goods. This was possible argued J. de Vries because an « industrious revolution » occurred at the time. This revolution had three components : farm households reallocated labour from the production of goods and services for on-site consumption to the production of goods for the markets. Goods for self consumption were replaced by purchased ones. Secondly, underemployment and unemployment declined : a greater proportion of the population worked and it worked more days per year. Finally, the pace and intensity of work increased. Labour productivity, expressed either as output per hour worked or as output per worker per year would have increased. The « industrious revolution » could solve the conundrum of increased consumption in an age of stagnant real wages : it allowed *household* incomes to go up.

J. de Vries argued that women and children, but primarily women, were the key to this « industrious revolution ». It was their labour that shifted from the production of goods and services for the home to goods and services for the market. Women and children were also the ones whose leisure (voluntary or otherwise) was sacrificed. Presumably, their productivity would also have been altered. Historians however are not of a single mind about the place of women and children in this Revolution. Ivy Pinchbeck had argued that the commercialization of agriculture had initially created wage earning opportunities for women and children. Hiring lower paid women and children for seeding, thinning, hoeing, weeding, pruning, picking crops and carrying dung made economic sense. But by the end of the nineteenth century, she said, women no longer played

5. HOFFMAN, P.T., 1991 and 1996 ; GRANTHAM, G., 1991 and 1993 ; SOLAR, P. & GOOSENS, M., 1991 ; O'BRIEN, P. & TONIOLO, G., 1991 ; CLARK, G. 1987 ; KOMLOS, J., 1988.

6. DE VRIES, J., 1993 and 1994.

a significant role on farms ⁷. Robert C. Allen's study of the impact of the eighteenth and nineteenth century enclosures indicated that the enclosure pushed women and children out of the agricultural labour force. The large farms that resulted from enclosures employed proportionally less women and children than small ones. In the seventeenth century however, women and children had formed an important part of the agricultural labour force. Structural changes, rather than commercialization, eliminated women and children ⁸.

Many historians agree that whatever happened in the seventeenth century, the commercialization of agriculture eliminated women and children's agricultural wage work by the eighteenth, or at the latest, by the nineteenth century ⁹. Other authors disagree, and claim that women were still active in farm labour at the end of the century, and that farm servants had not disappeared everywhere. Cottage industry also remained an important component of farm income in some regions ¹⁰. Women also appear to have remained active in dairying and on small farms. P. Sharpe emphasizes the latter point : the degree of women's participation in the agricultural labour force depended on the type of agriculture that prevailed in a given region. In England, arable farming and cattle raising had less and less use for their services, contrary to dairying and market gardening ¹¹. Consequently, the productivity per hour of women and children may not have diminished, but their productivity per year very likely collapsed. Across Europe (and North America) however, the mechanization of dairying, which occurred in the nineteenth and early twentieth century, could have diametrically opposed consequences. In many regions, it led to a « masculinization » of dairying, whereas in others, the opposite initially occurred ¹².

Historians of American agriculture for their part have shown a very limited interest in land productivity. The bulk of the existing work is on labour productivity ¹³. The emphasis is not surprising : in North America, there was no need to economize on land ; overall output could be increased

7. PINCHBECK, I., 1930.

8. ALLEN, R.C., 1992.

9. SNELL, K.D.M., 1981 ; HUMPHRIES, J., 1990 ; ROBERTS, M., 1979 ; DAVIDHOFF, L., 1986. For a European wide view, see B. ANKARLOO, 1979.

10. MILLER, C. 1984 ; HIGGS, E., 1995 ; HOWKINS, A., 1992 ; HORREL, S. & HUMPHRIES, J., 1993 ; WISTANLEY, M., 1996 ; SHARPE, P., 1991 and 1994 ; O'DOWD, A., 1994.

11. SHARPE, P., 1999, 1995 and 1991.

12. SOMMESTAD, L., 1994 and 1992 ; SOMMESTAD, L. & McMURRY, S., 1998 ; VALENZE, D., 1991 ; BOURKE, J., 1990 ; COHEN, M., 1984 ; HANSEN, B., 1982 ; COCAUD, M., 1999 ; McMURRY, S., 1992, 1994 and 1996.

13. PARKER, W. & KLEIN, J., 1966 ; BATEMAN, F., 1969 ; BALL, D.E. & WALTON,

merely by bringing more prime land into cultivation. In a continent that was land rich and labour poor, labour – not land –, productivity was the issue. According to many authors, the only way nineteenth century individual farmers could raise total farm output was by increasing labour productivity through mechanization. Quite a few studies thus look at the timing of the increase(s) in productivity and at its relationship with the introduction of machinery. William N. Parker and Judith L. V. Klein for instance claims that mechanization was the strongest direct cause of the productivity growth in grain. Without technical changes, westward expansion would have been accompanied by very little increases in per capita agricultural output – and consequently, by limited industrialization and urbanization. As western wheat was also exported to Europe, lower labour productivity in the U.S. would also have slowed down urbanization and industrialization in Europe as well. W. Parker and J. Klein also present increased land productivity as normally the result of technical changes such as artificial fertilizers, herbicides and pesticides ; however, none of those were available to farmers until the twentieth century ¹⁴.

But even in the United States, technology could not eliminate every productivity bottleneck, and not all farmers specialized in grain growing, even in the nineteenth century. And although the concept of an « *industrious revolution* » seems alien to American historians, one may detect a variation of this process just below the surface. Historians of women have noted an intensification of women's work on dairy farms in the nineteenth century. In Pennsylvania, the demand for dairy maids exceeded supply, and by the 1830s, female agricultural wages had increased sharply ¹⁵. In Nanticoke valley (New York), farm household reallocated labour from less to more profitable market production ¹⁶. Economic historians for their part point towards an intensification of women's work (or at least of work traditionally done by women) The northeast for instance emerged as a dairy belt before the Civil War, producing fluid milk, butter and cheese for markets (New York cheese was even exported to Britain). Milk production was slow to mechanize, as efficient milking machines were not developed until the twentieth century.

How then did Americans increase dairy output ? For Fred Bateman, the significant increase in milk production per cow that characterized the northern United States between 1850 and 1910 was the result of additional women and children labour input : women and children exchanged some

G.M., 1976 ; CRAIG, L.A., 1991 ; ATACK, J. & BATEMAN, F., 1987 ; CRAIG, L.A. & FIELD-HENDREY, E., 1993 ; WEISS, T., 1993 ; VAN ENDE, E. & WEISS, T., 1993.

14. PARKER, W. & KLEIN, J., 1966.

15. JENSEN, J., 1986.

16. OSTERUD, N.G., 1991.

of their leisure for work in the barn. There was a cost to this however : F. Bateman concluded that as fluid milk output per farm went up, labour productivity went down ¹⁷. In an article co-authored with Lee Craig, Thomas Weiss attributes the rising productivity of northern farms during the Civil War (1861-1866) not to the replacement of men by machines, but to the intensification of work performed by women and children : dairying, poultry and egg production, pork production and market gardening. All traditional women and children's activities, were being commercialized. They concluded that « Women and children shifted their time from unmeasured household tasks to market activities, or reallocated their efforts among farm and non farm market work » ¹⁸.

2. Data Biases

Labour productivity therefore cross cut some of the key questions asked by economic, but also by social and even political historians : ability of a society to increase food supply to keep up with demographic growth ; ability of agriculture to release workers to feed an « industrial revolution » ; emergence of a demand-driven consumer society ; impact of institutional and technological changes ; economic choices made by farmers and other members of their households, and motivations behind those choices. And from there flow numerous questions concerning the social interactions of different groups, and the social structure. But, as B.M.S. Campbell and M. Overton noted, calculating labour productivity is at least as much of a challenge than calculating land productivity ¹⁹. How can one measure labour input ? Historians and economists use one of two approaches to do this : they either try to estimate the population working in agriculture, or they try to estimate the number of days or even hours needed to accomplish production tasks. Factoring the labour of women and children can be a problem in both cases ; but leaving it aside can lead to distortions and unreliable conclusions, especially if, as J. de Vries suggests, an « industrious revolution » relying on women's and children's labour preceded technological and structural changes in agriculture.

The first approach bases its estimates of labour input on the size of the agricultural labour force. As this one is impossible to measure exactly in the nineteenth century, historians often derive their figures from the number of people reported in census schedules as employed in agriculture.

17. BATEMAN, F., 1969.

18. CRAIG, L. & WEISS, T., 1993, p. 546.

19. CAMPBELL, B.M.S. & OVERTON, M., 1991, p. 14.

This was for instance the approach used by P. O'Brien and G. Toniolo in their comparison of Italian agricultural productivity to the English one at the beginning of the twentieth century. They concluded that output per ha were similar, but that output per male labour equivalent unit was twice as high in England (P. O'Brien and G. Toniolo converted the work of women and children into male equivalent units). G. Clark used the 1851 census for agriculture for England, P. Solar and M. Goosens used figures derived from Belgian and Irish censuses, and Joanna Bourke used the data available in the Irish censuses between 1851 and 1911²⁰. The censuses have also been widely used in the United States for the same purpose.

But as Edward Higgs amply demonstrated for England, and Marjorie Abel and Nancy Folbres for the United States, censuses aggregates, and even manuscript schedules, under-enumerate agricultural labour, ignoring seasonal workers, miss-allocating unspecified labourers and servants, and leaving farmers' female relatives out of the agricultural labour force²¹. If female and child labour is under-reported in sources used by historians to estimate the size of the labour force, labour productivity will inevitably be exaggerated. Some historians tried to circumvent the difficulty by ignoring occupational designations in the census, and instead applying a participation rate to different age/sex/occupational categories. The difficulty consists in establishing what the participation rate should be. E. Higgs for instance revised the census figures by assuming various rates of participation for female relatives of the farm family head (worked half the year), for female relatives of farm labourers (worked two months a year), and for general servants on farms (devoted 25 % of their time to farm work). He concludes that between 1851 and 1871, women represented between 25 and 27 % of the agricultural labour force (as opposed to 10 % dropping to 6 % in previous estimates). P. O'Brien and G. Toniolo, and G. Grantham, used a similar approach for some of the European countries²².

This approach requires the use of qualitative sources to correct the quantitative ones, and the debate mentioned in the previous paragraph shows that the answers are not self evident. P. Solar and M. Goosens's comparison of Irish and Belgian agriculture seems to have run into the same difficulty. They used adjusted census figures to estimate the size and composition of the Belgian agricultural labour force, but seem to have relied on unadjusted census figures for Ireland.

International comparisons are therefore fraught with difficulties. Long term comparisons within the same country are not safer : the labour of

20. CLARK, G., 1991b ; SOLAR, P. & GOOSENS, M., 1991 ; BOURKE, J., 1990.

21. HIGGS, E., 1995 ; ABEL, M. & FOLBRES, N., 1990.

22. HIGGS, E., 1995 ; O'BRIEN, P. & TONIOLO, G., 1991 ; GRANTHAM, G., 1993.

women and children was reported differently in different census years, and the data from the different censuses are not always directly comparable ²³. One could hope on the other hand that comparisons within a country in the same census year would be safe ; the bias should be the same in all the census series. But a constant under-enumeration of female and children will not distort results only if the different populations have the same age/sex/occupation composition. And this does not seem to have been the case. E. Higgs, Sara Horrel and Jane Humphries and indirectly R. Allen, alert us to the fact that the labour force composition is not uniform : large farms employed a different mix of workers than small ones ; dairy farms, a different one than grain farms ; Northern English farms were different from Midland ones ²⁴. S. Horrel and J. Humphrey also noted dissimilar patterns of labour force participation among English agricultural labourers' wives. In high wage areas, their participation declined, then increased in the middle of the nineteenth century, and then collapsed. In low wage areas, it first went up, and declined after the middle of the century. They claim too that the position of women and children in the labour force was not uniform over space ²⁵. Winstanley noted that in Lancashire, the availability of off – farm wage work could result in lesser farm work by women, and especially by children ²⁶.

In the United States, the work of L. Craig has shown that before the Civil War, women and children's labour force participation in agriculture varied from region to region, and the variations could be explained by the type of agriculture practiced in each of them, but also by cultural norms. Children and teenaged females played a significant role in land clearing (capital formation) and in market production in the Midwest, but none in the Northeast. In the Northeast on the other hand, adult women's contribution was worth 7 to 8 months of a hired hand's wages – twice as much as in the Great Lakes region. In the Northeast, teenaged girls kept houses, while adult women worked in the dairy alongside men. Midwestern males on the other hand would not be caught dead near a cow : milking was beneath their dignity, and they despised the « Yankees » for doing that chore. Dairying in the Midwest then should be attributed to the women ²⁷.

Comparisons over time and place can then quickly become meaningless if one does not pay close attention to the exact composition of the

23. HIGGS, E., 1995 ; WINSTANLEY, M., 1996 ; HORREL, S. & HUMPHRIES, J., 1993.

24. HIGGS, E., 1995 ; ALLEN, R., 1992.

25. HORREL, S. & HUMPHRIES, J., 1993.

26. WINSTANLEY, M., 1996.

27. CRAIG, L.A., 1991.

labour force. One also needs to make sure that all the farm output produced by the farm workers included in the calculations is included. And here again, a gender bias is possible.

3. Men and women's activity patterns

P. Solar and M. Goosens for instance noted that at the beginning of the nineteenth century, Irish tenant's wives at most worked one month a year, and that they contributed to the family income through the sale of eggs and poultry, which were not included in output. Belgian women on the other hand worked in the fields. Did they produce eggs and poultry too ? If they did not, they clearly allocated their agricultural labour differently from the Irish ones, but in total, they may not have worked longer hours in agriculture than their Irish counterpart. All depends on how much poultry and eggs the Irish produced. If Irish women were producing poultry on a commercial scale, the difference between high output/high labour input (and lower labour productivity), Belgian farms and the Irish ones would not have been as large as assumed. In fact, Irish women probably did not produce much poultry, but it is more prudent to check ²⁸.

The nature of women's work may also shift over time, and consequently their work may be included in the calculations at some points and not at other. A shift in rural women's activities occurred in Ireland between 1890 and 1910: dairying became a masculine activity. Women were instead encouraged to rear poultry, engage in home industries, or devote more time to housewifery. They substituted unrecorded for recorded activities ²⁹. Weiss shows that in the United States home manufacturing declined through the beginning of the nineteenth century and then collapsed ³⁰. Sally McMurry claims that in Oneida County (New York), women started making cheese for markets when the spread of factories pushed them out of domestic cloth production. After the Civil War, when cheese making moved to factories, they either followed their work there, or switched to poultry and eggs production... or to homemaking ³¹. Home manufactures included cloth production, and in North America, weaving was an unmarried woman's task. Women also made soap, candles, kept bees, knitted, and in some areas took outwork from merchants, such as plaiting straw for hats. Home manufactures are often left out of farm

28. SOLAR, P. & GOOSENS, M., 1991.

29. BOURKE, J., 1990.

30. WEISS, T., 1993.

31. MCMURRY, S., 1996.

output calculations. So is poultry and eggs production, which is not included in nineteenth century censuses. Outwork – which was done instead of farm work – is also left out. The omission of home manufacturing can result in labour productivity seeming to go up when women turn to cheese making, and in productivity being underestimated when they shift to poultry production.

Deriving labour input figures from censuses is not impossible – but census alone are fragile sources. Clearly, one needs to know what different categories of workers were really doing. At the very least, the participation rate of the different groups (adult males, adult females, children, family members, hired hands, servants) should try to reflect the nature of the agriculture in which they were engaged.

Other authors have avoided the difficulties inherent in the census by not using it. They instead measure the time needed to perform the different tasks associated with production. Although usually expressed in « man-day/acre » or « man-hour/acre », this is really an age and gender neutral measurement. This kind of data is hard to find though. For the United States in the 1840s, W. Parker and J. Klein relied on reports to state agricultural societies and on plantation records ; for the beginning of the twentieth century, they used U.S. department of agriculture and agricultural experiment stations data. For Britain, R. Allen has relied on Arthur Young's data for « representative farms » for the late eighteenth century, and on 1808 data from T. Batchelor and from R. Parkinson ³². This type of data however is not available for all times and places, and one has to derive the needed figures from other sources.

Some historians have tried to derive the amount of time needed to perform a task from the ratio of piece-work for a given task, to the day rate paid agricultural labourers. This approach assumes all tasks were paid the same underlying rate, in proportion to the time needed to perform them, but irrespective of the age and gender of the worker. It is the case for P. Hoffman's work about eighteenth century France. Using the wages of unskilled males as proxy for labour productivity also rest upon the assumption of a near constant relationship between wages and productivity ³³. L. Craig and E. Field-Hendrey similarly assumed a constant correlation between wages and productivity-even using the phrases « low productivity » and « lower female to male wage ratio » interchangeably ³⁴. This immediately raises a question : were women paid what they were worth, or payed « women's wages », as they were later in manufacturing ?

32. ALLEN, R., 1991 and 1992.

33. HOFFMAN, P.T., 1991 and 1996.

34. CRAIG, L.A. & FIELD HENDREY, E., 1993.

The gap between men's and women's wages is usually very wide. Moreover, it seems fairly stable : women earned between half and two third of men's wages in agriculture and in manufacturing. This has led some historians to argue women were paid customary, and not market wages ³⁵.

Joyce Burnett however disagrees with this interpretation. On the one hand, she argues that in the 1770s in England, the unskilled agricultural labour market was not segmented. Gender norms did not prevent substitution between male and female unskilled workers ³⁶. Job market segmentation increased during the « industrial Revolution ». This however did not lead to women being paid customary wages independent of their productivity. Piece rates were the same for men and women. Time rates on the other hand were different, and were lesser for women. According to J. Burnett, women were paid lower daily wages because they worked lesser hours, were more likely to receive part of their wages in kind, and, being physically weaker and less likely to have received any training, were less productive, on an hourly basis, than men. Female wages accurately reflected their output levels ³⁷. J. Burnett's argument however also demonstrates that deducing productivity from daily wages is not straightforward : lower « man-hour/acre » productivity was not the only reason why women were paid lower wages, and one may not always be in a position to deconstruct daily wages.

4. Wages discrimination

In addition, as J. Burnett points out, wages reflect productivity only in a reasonably competitive job market. Underpaid workers should have moved to areas or into sectors where they were paid what they were worth. P. Sharpe identified this phenomenon in the west counties in the eighteenth century ³⁸. Women and children though could not travel in search of work as freely as men. Travels were less safe for women. There were also cultural impediments to female geographic mobility : « respectable » women did not tramp around the countryside – and the desire for respectability was not limited to middle class women. Married women, and women with young children were even less mobile. P. Sharpe's female migrants were single women (and prone to giving birth to illegitimate

35. HUMPHRIES, J., 1991 ; BERG, M., 1993 ; ROSE, S., 1992.

36. BURNETT, J., 1996.

37. BURNETT, J., 1997.

38. SHARPE, P., 1991.

children). Married men, who might not hesitate to migrate looking for work, expected their wives to stay home (although not necessarily in the house). Mothers of small children could not even take most of the jobs offered by nearby farmers. Women's pay scale then may not have reflected their true productivity, but their low mobility and lack of employment opportunities. They were the agricultural equivalent of sweated labour.

Cultural factors could compound those structural ones : there could be some stiff resistance to letting women do « men's work », even when skills and strength were not issues. In period of employment contractions, men tried to protect their jobs by preventing women from getting them. The whole process was usually bolstered by a rhetoric defining a wide range of activities as « males ». Employers soon learned that fighting the men was not worth their time and effort, especially as it guaranteed a pool of badly underpaid females for some of the jobs. S. Horrel and J. Humphrey reached a similar conclusion : in nineteenth century England, economic considerations were not sufficient factors to predict women and children's labour force participation. Institutional and ideological obstacles stood in the way. They emerged at the very end of the eighteenth and were particularly strong afterwards. They suggest that needs combined with gender norm to determine whether women, especially married ones, would seek agricultural employment.

It remains possible that women and children were constrained by demand in their attempts to contribute to family income and that a man's occupational status carried with it ideas about appropriate employment patterns within families which were relatively independent of his earning³⁹. Occupational crowding made possible paying workers less than their productivity warranted. And although existing work suggests that crowding limited women to low productivity work paid what it was really worth, one should not assume this was always the case. Occupational crowding made paying workers less than what their productivity warranted possible. J. Burnett again stresses this point « wage discrimination appeared where the market was not disciplined by competition » she argues⁴⁰.

In many of the studies mentioned so far, « low productivity » also seems to reflect, not a lesser capacity to produce output, but involvement in labour intensive, not mechanizable tasks, or plain underemployment. And underemployment seems to have struck women and children first, resulting in their being paid less than they were worth. Several of the studies mentioned here hint at a pool of redundant females and children,

39. HORREL, S. & HUMPHRIES, J., 1993, p. 104.

40. BURNETT, J., 1997.

with no where to go. Claudia Goldin and Kenneth Sokoloff and later L. Craig and E. Field-Hendrey claim that women and children were « less productive » in the United States North than in the South – that is paid proportionally less than the men ⁴¹. R.C. Allen argues that in the South Midlands, eighteenth and nineteenth century enclosures resulted in agriculture shedding its female and juvenile labour force. This did not trigger industrialization, or even out-migration, but pauperization. P. O'Brien and G. Toniolo also describe an Italy suffering from massive rural underemployment. The Italians coped by specializing in labour-intensive crops.

Even in the United States, the lack of female employment opportunities could lead to low labour productivity. F. Bateman study of the dairy industry concluded that northern farmers increased milk output through additional labour input, rather than through the purchase of more productive pedigree milk cows, because the work was done by women and children, who had a very low opportunity cost. The women and children in short had little else to do. F. Bateman though may have been a bit rash in this conclusion : only a fraction of the milk was sold as fluid milk. The rest was turned into butter and cheese – by the women. The time they spent in the barn milking, feeding and mucking was not spent in the dairy. Their opportunity cost then may not have been as low as he claims. A direct link between women's and children's wages and their productivity in short should never be taken for granted.

Both issues of labour productivity and labour supply fluidity bring us back to one of the « big » questions those calculations try to answer. When, how, did agriculture release the workers needed by the Industrial Revolution ?

In the South Midlands, labour productivity increases did not result in industrialization. Allen attributes this to the lack of skills of the labour force, and the lack of an infrastructure to tap it. Those are certainly significant factors. But the fact the released workers were disproportionately women and children had an impact too. Earlier enclosures in the region had resulted in migrations to London. No such thing was happening now. Couldn't this be attributed to the fact women (especially married ones) and children could not easily travel to urban or industrial centres, unless their husband/father led the way ?

In New England on the other hand, the released labour was made of teenaged females. Factory owners attracted them to their mills by providing them with boarding houses, and acting in *loco parentis*, thus

41. GOLDEN, C. & SOKOLOFF, K., 1982 ; CRAIG, L.A. & FIELD-HENDREY, E., 1993.

reassuring their parents ⁴². Among the dairy farmers of upstate New York, another pattern emerged. According to S. McMurry, the young women who made cheese for their family resented the increase labour thrust upon them, and actively sought alternative, such as education and positions as school teachers. They released themselves from agricultural work, and did not go into the factory either.

Increased labour productivity is a necessary prerequisite to industrialization, but it is not a sufficient one. The right workers had to be released in the right place, otherwise, the only thing that happened was unemployment. And low labour productivity could be an incentive to leave the farm if alternatives were available !

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