Title	New developments in Irish population history 1700-1850
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Publication date	1983-12
Series	UCD Centre for Economic Research Working Paper Series; No. 17
Publisher	University College Dublin. School of Economics
Item record/more information	http://hdl.handle.net/10197/1406
Notes	A hard copy is available in UCD Library at GEN 330.08 IR/UNI

NEW DEVELOPMENTS IN IRISH POPULATION HISTORY, 1700-1850

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Working Paper No. 17

December 1983

The helpful suggestions of James S. Donnelly, David Dickson, P.T. Geary and Brendan Walsh are gratefully acknowledged.

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With the publication of Wrigley-Schofield's Population History England joins France and Quebec in having a comprehensive precensal population history based on family reconstitution methods and samples of local sources. Given the poor quality of Irish parish registers and their almost complete absence for periods before 1780, Irish demographic history is unlikely to reach that stage in the near future.[1] Research must continue to rely on a less ambitious array of sources, and the staples of family reconstitution work such as life expectancy and birth intervals consequently hardly feature in this survey.[2] Nonetheless, there is much of interest to compare and discuss. Demographic variables have always occupied a central role in Irish history, more so perhaps that any other western country, and Ireland's position as an "outlier" and the brutal nature of demographic change there render the country a peculiar and instructive case study. The comparison with England seems particularly appealing and has been attempted before[3] but in light of recent research much more can be said.

During the period under discussion here, political and economic integration between Britain and Ireland proceeded apace. Both countries experienced rapid population growth at about the same time. The differences are equally striking: Britain could absorb its extra labour while Ireland could not and succumbed to Europe's last true subsistence crisis. Did population growth in the two islands follow similar patterns? What do we know about shifts in mortality, fertility, nuptiality, fecundity and so on in Ireland? The first part of this essay will outline the contours of Irish population change. The second part will discuss nuptiality and fertility, and the third part of the paper will deal with the changes in mortality, morbidity, and emigration in the prefamine period.

The writings of Kenneth H. Connell hold a unique place in Irish historiography.[4] His book is the sole monograph since the early nineteenth century to deal exclusively with Irish demographic history, producing both fresh estimates of precensal population levels and a cogently-argued model of population change to explain them. Connell's influence has been such that his hypotheses have conditioned the controversy about the prefamine economy, and his estimates achieved semi-official status.[5]

Before Connell's revisions, historians had been content to rely on the "political arithmetic" of Petty, Dobbs, and other contemporaries in presenting precensal population estimates.[6] These estimates were all based on hearth tax returns and as such had to make critical assumptions about two unknown variables: the proportions of houses actually included in the counts, and mean household size (MHS). Connell roundly rejected all previous estimates, with the exception of that of Gervase Bushe for 1788. On the suspicion that house totals were downward biased, he inflated them all by half and Petty's estimates for 1687 by two-thirds. He further assumed that MHS hovered around 5.2 until 1732 and from then on rose steadily to 5.65 in 1788. These computations led to a new set of estimates which indicate a quadrupling of population between 1687 and the Famine, growth interrupted only by a hiatus in the late 1720s. The annual population growth rates implied by Connell's calculations are .74 percent between 1687 and 1732, .25 percent for the period 1732-1754, .85 percent between 1687 and 1781, and 1.61 percent for the years 1781-1791.[7] There are no usable hearth tax data after 1791, and the earliest observation we have for the nineteenth century is the 1821 census. Linking Connell's revised estimates to the censuses provides rates of growth of 1.19 percent for the period 1791-1821 and .92 percent for 1821-1841. Connell's data implied that population growth before 1821 was somewhat slower that earlier estimates had suggested, but still supported the long-standing view that Irish population before 1821 grew faster than anywhere else in Western Europe.

A generation after the appearance of Connell's book, his estimates have been criticized from three directions. First, a close re-examination of the hearth tax evidence at the county level suggests that collection was relatively well-administered before 1750, so that Connell's revisions of house-totals before that date are too radical. Even after the middle of the eighteenth century, when increased corruption and the growth of the tax-exempt stratum combined to reduce the credibility of the house counts, the totals do not seem to require such drastic revisions.[8] Second, research on MHS indicates that while Connell captured the population trend correctly, its level in the early eighteenth century was lower than he argued.[9] Third, analysis of the age structure of the population in 1821 with the Coale-Demeny model life tables, on plausible assumptions about contemporary mortality, is again consistent with higher growth before that date. Such an exercise indicates a growth rate of 1.5 percent or more for some years before 1821.[10] Table 1 presents Connell's and some more recent estimates for benchmark years, including the three census years and Joseph Lee's recent revisions of them.

Table 1: Irish Population Estimates (in millions)

	Connell	Daultrey et al.	Clarkson	Census	Lee
1687	2.2	2.0	1.7		
1712	2.8	2.0 - 2.3			
1725	3.0	2.2 - 2.6	2.2		
1732	3.0	2.2 - 2.5			
1744		1.9 - 2.2			
1753	3.2	2.2 - 2.6	2.3		
1791	4.8	4.4	4.2 - 4.6		
1821				6.8	7.2
1831				7.8	7.9

1841 8.2 8.4

Sources: Connell, The Population of Ireland, p. 25; Daultrey, Dickson and O Gráda, "Eighteenth Century Irish Population", p. 624; Clarkson, "Irish Population Revisited", p. 26; J.J. Lee, "On the Accuracy of the Prefamine Irish Censuses," in Goldstrom and Clarkson, eds., Irish Population, Economy and Society, p. 54.

A few observations on Table 1 are in order. The first must be a word of caution: all the estimates in Table 1 are rather speculative. Nevertheless, the revisions strengthen Ireland's position at the top of the population growth league. Only Britain comes close to achieving an average annual growth rate of about 1 percent for such a long period (see Table 2). The data also support Canny's view that Cullen's recent estimate of the population of Ireland in 1600 is implausibly high, give the pastoral orientation of farming and the vast expanses of unreclaimed bog and woodland.[11]

Table 2: Some Comparative Population Growth Rates, 1700 -1845

(in percentages per annum)

a. 1700 - 1845

France	0.4
England	0.8
Ireland	0.8

b. 1750 - 1845

France	0.4
England	1.0
Scotland	0.8
Sweden	0.7
Ireland	1.3

Sources: Louis Henry and Yves Blayo, "La Population de la France de 1740 à 1860", Population, numéro spécial, 1975, pp. 95, 99; Brian Mitchell, European Historical Statistics, 1750-1970 (London, 1975), pp. 19-24; E.A Wrigley and R.S. Schofield, The Population History of England, 1541-1871: A Reconstruction (London, 1981), pp. 208-209.

The data fail to register any serious growth between 1687 and the 1740s, but this can be seen to be largely the result of the severe harvest crises of 1727-29 and of the devastating famines of 1740-41 and 1744-46. Connell's numbers fail to capture the full impact of these temporary setbacks in population growth. Between the middle of the eighteenth century and 1820 population grew at a rapid rate averaging between 1.6 and 1.7 percent annually. The corrected hearth tax evidence also indicates that growth was quite uneven

regionally: it reached about two percent in the western province of Connacht, but only 1.2 to 1.3 percent in Leinster. The same evidence can be used to pinpoint the regional impact of the major subsistence crises, a dimension equally lacking in Connell and in Wrigley-Schofield.[12]

After 1820, perhaps even earlier, population growth started to slow down, but still averaged a respectable .9 percent annually in the two and a half decades before the famine. The census data imply a rather sharp deceleration in the 1830s, which in part must be attributed to the inconsistencies between the first three censuses. While the 1821 and 1841 censuses suffered from some degree of underenumeration, the 1831 census was widely reputed to suffer from overenumeration. Recent work by Lee and by Boyle and O Gråda defends the 1831 estimates; for Lee it is even the most accurate of the three.[13] Even if Lee's revisions of the prefamine population totals turn out to be too extreme, it is likely that a deceleration of population growth took place in Ireland in the decades before the Famine. The annual rate of growth may have fallen off to 0.9-1.1 percent in the 1820s and .50-.75 percent in the 1830s and early 1840s. An extreme version of this view is presented by Carney who maintains that population growth had ground to a halt on the eve of the famine. Carney's position has been criticized for its weak statistical basis and can no longer be accepted.[14] In the prefamine decades, the rate of growth of population in Ireland was heavily affected by emigration, a subject we address below.

II

Wrigley-Schofield's interpretation of eighteenth century English population change closely mirrors Connell's interpretation of Ireland's demographic history of the period. Like Wrigley-Schofield, Connell emphasized the rise in the birth rate resulting from a rise in the propensity to marry, which implies both a decline in the average age at marriage (AAM) and a decline

in celibacy. He postulated that the propensity to marry rose as a result of an increased demand for labour and --- a particular Irish twist --- a reduction in the cost of family formation due to the diffusion of the potato. He also sifted through the evidence for a reduction in the death rate, but in the end dismissed it as unimportant. The predicated mechanism for demographic change contrasted sharply with the conventional wisdom on England at the time, as Connell himself was quick to point out. His view of Ireland fits the Wrigley-Schofield schema rather well, and it may not be far-fetched to point to Connell's work as a precursor of the modern interpretation of English population history.[15]

But does Connell's interpretation fit the Irish case? His main quantitative source was the Poor Inquiry of the 1830s, an immensely rich source on a wide array of subjects, but not a good source on demographic data.[16] The massive 1841 census is, in spite of its shortcomings, by far the richest and most reliable source for demographic data on prefamine Ireland.[17] Any conclusion based on anecdotal evidence --- no matter how extensive --- which contradicts the census will have to be re-examined with great care. As Drake has pointed out, the census does not support the early-marriage hypothesis.[18] A case in point: the tourbook writer Henry Inglis claimed in 1834 that "fourteen and thirteen are common ages for marriage of girls" around Dingle, co. Kerry, but the census shows that 99.48 percent of all girls in Kerry, aged 13-16 were unmarried.[19] The 1841 census underlines the risk of relying on impressionistic evidence for demographic purposes. According to the census, of the 375,975 women aged 14-16, only 487 were ever married. Moreover, of the 756,726 women aged 17-25, only 146,257 (19.3 percent) were married. Computing mean and median ages at marriage yields ages of 24-25 for women and 27-29 for men. On the eve of the Famine, at least, Irish women appear not to have differed much from women in England, Belgium, and France and seem to fit the Hajnal "European pattern."[20]

Reconciling the literary evidence with the census is not as difficult as it appears, however. First of all, there is Laslett's warning about the misleading nature of literary sources in this respect.[21] Next, we should recall that AAM is asymmetrically distributed with the mode less than the median and the median less than the mean. Contemporaries may have been commenting on the mode rather than the other moments. Thirdly, the 1841 census describes a situation in the middle of the nineteenth century, after a few decades of "demographic adjustment". Connell justly warned against using the 1841 census as a "peephole" for the whole prefamine century.[22] If marriage ages rose in the decades before the famine, say from 20-21 to 24-25, the propensity to marry could be viewed as responsible both for the unprecedented rapid growth after 1750, and the deceleration after 1800. In sum, we are in the peculiar position that the years about which we know most, the decade before the Famine, may be misleading as a representation of the period under discussion here.

As it happens, the census itself does not provide much evidence in support of the hypothesis of declining marriage propensities before 1841. The proportions ever-married among women aged 46-55 and women aged 55 and over are about the same (87.5 percent). Had the propensity to marry declined steeply in the 1810s and 1820s, we should have observed a higher proportion ever-married among the women aged over 55. Of the women aged 36-45, 84.4 percent were, or had once been, married. This could indicate some slight tendency toward higher marriage ages but in all likelihood the difference is due to those women whose first marriage occurs in their late 30's. The census also contains data on age of marriage based on retrospection (i.e., asking people when they were married). These data imply an average age at marriage of 24.36 for women in 1840 and 23.82 in 1830. While these figures are again consistent with a slight rise in the marriage age, the evidence is hardly definitive, since the retrospective nature of the data tends to bias downward the age at marriage of

persons married many years ago.[23]

As far as the eighteenth century is concerned, we operate in a statistical darkness. Connell's scenario presumably implies a fall in the marriage age in the middle of the eighteenth century. References to early marriage ages predate that period by a century or more. William Petty's remark that "Irishwomen marry upon their first capacity" is well-known but by no means unique.[24] Dickson's analysis of Cromwellian transplantation certificates tentatively suggests an AAM of not more than 22 years for a sample of women in counties Dublin and Waterford who were threatened with transplantation in the 1650s.[25] Despite our earlier warning concerning the use of anecdotal evidence, we cannot reject the hypothesis that in the eighteenth century early marriage was the norm and the propensity to marry more or less constant long before 1750. This low AAM, in all likelihood, turned upward from 20-22 to 24-25 between 1800 and 1845, probably closer to 1800.

As far as birth and fertility rates are concerned, today we know a fair deal more than in Connell's day. Connell discovered from age statistics data that the number of children aged under 1 or under 5 per 1000 women was much higher in Ireland than in England and Wales. For children under age 1, for example, the respective figures are 187 and 112, which gives Ireland a "lead" of no less than 67 percent! Connell found it difficult to reconcile this finding with the crude birth rates reported by the 1841 Irish census, which were 33 birth per 1000, about half-way between the estimates for England and Wales in 1836-46 and 1851-60.[26] If we accept both these findings, the age and sex structure of the two countries had to be violently different.

Fortunately, no such far-fetched rationalization is needed: the birth rate reported by the 1841 Irish census is in error. A more accurate crude birth rate can be calculated utilizing a somewhat complex computation based on the reported age distribution of infants.[27] Ireland had indeed a higher crude birth rate that Britain: the estimate for the country as a whole is between 38

and 40 per 1000. These estimates allow us also to compute general and marital fertility rates. The general fertility rate (births per 1000 women aged 17-44) was between 177-186 and the marital fertility rate between 360 and 377. For comparison's sake, we may note that the general fertility rate was between 130 and 145 in Britain in the 1840s and 1850s, and the marital fertility rate in England and Wales in 1851 was 307, according to the census. Prussia and France had marital fertility rates of, respectively, 314 and 196 in the 1880s.[28]

The data do not allow us to calculate age-specific fertility rates, but we can compute for comparative purposes Ansley Coale's measures I_m, I_f, and I_g.[29] The estimates for Ireland are approximately .45 for I_m, .36 for I_f and .82 for I_g. Since I_f is the product of I_m and I_g (abstracting from illegitimacy), only two variables are independent. Comparing I_m and I_g with countries in Europe for which the values of these variables were computed, it becomes clear that the high crude birth rates in Ireland are explained primarily by differences in marital fertility, not high propensities to marry.[30] This is not to say that nuptiality did not affect the birth rates during the years of very fast population growth before 1821. But marital fertility rates remained abnormally high in Ireland even when marriage propensities had reached levels which were more or less on a par with other countries. After the famine, when the propensity to marry in Ireland was declining to almost unheard-of depths, marital fertility remained high. The conclusion is that while the propensity to marry probably played a major role in Irish population growth in the eighteenth century as Connell postulated, the picture is more complex than that. Marital fertility was exceptionally high in Ireland in 1840, and it seems at least likely that this variable played an equally important role in the century prior to the Great Famine.

Regrettably, the techniques used to estimate fertility rates in 1841 rely on the 1841 census, and cannot be used to reconstruct a time series. Therefore we do not know with any precision whether birth rates were already declining

before the Famine. It is often maintained that the decades after Waterloo were a period of "demographic adjustment", in other words, that growth was already slowing down as a response to population pressure. Emigration from Ireland may be interpreted as a response to population pressure, a "Malthusian Preventive Check". If this view is correct, an interesting question arises: why was Ireland the only country in the first half of the nineteenth century to respond in this way to population pressure?

Demographic adjustment *strictu sensu* would have to include a decline in nuptiality and birth rates above and beyond what can be explained by emigration. One recent approach to this question combines information about the age structure of the population in 1841 (appropriately adjusted) and of the emigrants of the previous two decades with plausible assumptions about age specific mortality rates in the prefamine period. This technique permits back-projection of the surviving 1841 population, and estimates of the birth rates annually between 1822 and 1841. The results of this exercise suggest a decline in the birth rate from 41-42 per thousand in the early twenties to 37-38 in the late thirties.[31] The records of Dublin's famous Rotunda Lying-in Hospital also contain evidence on the issue. In the prefamine decades the hospital catered to over two thousand mothers most years --- a good share of the capital's poor. Admittedly, marriage age in a poor urban milieu may have been more sensitive to changing economic conditions than the norm, but an analysis of first-parity mothers using the Rotunda indicates a rise in their average age from 22.4 years in 1811-2 to 23.7 years in 1840.[32]

How can we explain the high marital fertility rates in prefamine Ireland? Unfortunately, here our knowledge is most fragmentary and anecdotal, and what little statistical evidence we have confirms that the story is in all likelihood far more complex than Connell or anybody else has suggested. The regional distribution of marital fertility rates in 1841 shows the following picture. First, it confirms Connell's view that for the country as a whole

urban marital fertility rates were somewhat lower than rural. Second, the province of Ulster constitutes an important exception to that rule: Ulster urban marital fertility rates were higher than anywhere in Ireland, reaching 410 births per 1000 married women aged 17-45. Third, within rural Ireland (which accounted for six sevenths of the population) there was not much variation in marital fertility. The upper bound estimates display a range of 365 per thousand women married (rural Connacht) to 396 (rural Leinster). Fourth, attempts to isolate the determinants of marital fertility by means of cross-sectional regression analysis yield inconclusive results. Fifth, as might be expected, there is a positive correlation between marital fertility and the female AAM: Ulster urban women had a slightly lower AAM than rural women in Ulster.[33]

Compiling a list of possible causes of the comparatively high fertility of Irish women is simpler than confronting these hypotheses with systematic evidence. The arguments fall into three broad classes: higher fecundity, social or religious taboos on contraception, and a desire for large families. As far as fecundity is concerned, the high nutritional value of the potato diet could have played a significant role but little supportive evidence has been presented thus far.[34] In the regressions which attempt to explain the marital fertility rate, various indices of potato-dependency were one of the few variables which seemed to affect the dependent variable. The coefficients were all positive, with t-statistics varying between 2.28 and 1.68 depending on the precise definition of the variables chosen. Since the coefficients are rather small, and since there is obviously no one-to-one correspondence between fecundity and marital fertility, however, this evidence cannot be deemed definitive. What is known is that the Irish in general and their women in particular were widely described as healthy and good-looking. Adam Smith's famous remark that potatoes were "peculiarly suitable to the health of the human constitution" can be complemented with numerous observations from other

contemporary observers to the same effect. High marital fertility rates were maintained by Irishwomen who emigrated. Insofar as the Irish living overseas clung to many of their traditional social customs, this perseverance is consistent with either cultural or genetically determined differences. The fertility levels of Quaker immigrants and their descendants supports the former view: Quakers in Ireland experienced consistently higher rates of marital fertility than their counterparts in southern rural England.[35] This fact raises interesting questions on demographic inertia among emigrants: the demographic behavior of the Irish overseas offers an excellent opportunity to study the extent to which emigrants maintained the characteristics of the country of origin.

A likely explanation of the difference in fertility between Ireland and other countries is that the Irish practiced negligible birth control --- significantly less so than everybody else. At this stage, very little is known about the subject. The only explicit literary prefamine references to contraception known to us occur in Cùirt an Mheánoíche, a long ribald poem written in the 1770s. Connell, somewhat lamely perhaps, asserted that the critics' silence on the matter was proof that the Irish did not control fertility within marriage.[36] The influence of the Catholic Church naturally comes to mind, though it must be stressed that the influence of the Church increased greatly after the Famine, and there is some evidence that the lower-class Irish may have been less devout in the first half of the nineteenth century than subsequent history would make us suspect.[37] In any event, there are indications that even before the Famine the Irish were on the whole sexually very conservative. Illegitimacy was low, prostitution of modest magnitude (much of it catering to the military), and contemporaries were impressed by the chastity and conjugal fidelity of Irish women.[38] Sexual conservatism seems to correlate negatively with the spread of contraceptive techniques.[39] It has to be admitted that at this stage it is not possible to

assess precisely the importance of this factor, or similar ones like the age at weaning, in Irish population history.

In dismissing the possibility of contraception, Connell added that the Irish would not have practiced it even if they had known how to. This raises the interesting issue that children in Ireland may have been more desirable than elsewhere. The difference could have been due either to a different set of preferences in Ireland or because the relative price of Irish children was lower than elsewhere (or both). Arthur Young wrote in 1780 that "children are not burthensome. In all enquiries I made into the state of the poor, I found their happiness and ease relative to the number of children".[40] An intriguing possibility is that the absence of a formal poor law before 1838 increased the desire for children by the insurance and pension motives. Such motives seem particularly important in a society in which landownership was nonexistent among the peasantry and monetization at a comparatively low level, so that it was relatively difficult to insure oneself using alternative assets. In contrast to the Malthusian view that Poor Relief encouraged fertility, the Irish case seems to indicate that the opposite may be closer to the truth. Rural-domestic industry was of considerable importance before its abrupt decline in the late 1820s, and may have contributed to the economic desirability of children. With increasing competition from factory products, Irish cottage industries --- like most cottage industries in Europe in the nineteenth century --- collapsed and the opportunities for economic activity for children declined. The Poor Law Inquiry Report of 1836 reports over and over again that outside employment for children was extremely hard to find in Ireland. Perhaps a part of the demographic adjustment in Ireland in the decades before the famine can be attributed to the decline of rural industry.[41]

On the supply side of the equation, it is likely that the peculiar quasi-subsistence agriculture which permeated most of Ireland reduced the marginal cost of children to a level below European norms. The prefamine economy was characterized by cheap energy from peat, cheap food from potatoes, and shoddy clothing, housing, and utensils. The marginal cost of feeding another mouth was low in this economy, and worries about subdivision of the family property were not significant. The latter factor may have started to change after 1815 when landlords increasingly tried to prevent subdivision and subletting of small holdings and made deliberate attempt to reduce the "subsistence sector" by trying to convert lands from tillage agriculture to pasturage. The limited success of these attempts in the face of persistent resistance among the peasant, cast doubt on the importance of this factor in curtailing birth rates.

One final point: while Irish marital fertility was high, so were infant and child mortality (see next section). It is obvious that high birth rates led to high infant mortality rates, but the reverse causation is equally plausible. Presumably the objective of the parents was to have some number of surviving children rather than a given number of confinements.[42]

III

As in the case of birth statistics, the 1841 census continues to be by far the most detailed source on mortality in prefamine Ireland. But here, too, the census cannot be used without proper adjustment for error. The census reported a total crude death rate of 17.4 per thousand in 1840, and 16.8 per thousand for the years 1836-40. By fluke, this death rate is consistent with the equally erroneous birth rate of 33 per thousand reported by the census. A natural growth rate of 1.6 percent per annum combined with the average annual emigration rate of .7 percent produced precisely the average annual growth rate

of .9 percent implied by the 1821 and 1841 censuses. A mortality rate of 17 per thousand is however unbelievably low as the census commissioners were the first to point out. The revised crude death rate of about 24 per thousand shows Irish mortality to be about on a par with the Netherlands and slightly higher than Great Britain.[43]

Did declining death rates contribute to the growth of Irish population in the century before the Famine? Connell failed to find much evidence for the importance of the death rate and placed the responsibility of population growth on factors influencing the birth rate in Ireland, but clearly believed that declining death rates were primarily responsible for the accelerated population growth in Great Britain.[44] The role of falling death rates in Britain has survived in somewhat modified form.[45] It may well be asked whether there are grounds for reviving it for the case of Ireland. We shall discuss three aspects of mortality in some detail here: infant mortality, morbidity, and the effects of diet and subsistence crises.

Infant mortality is in many ways the most interesting subject in any study of mortality. Family reconstitution studies are responsible for most available estimates of infant mortality, and they show a marked decline over the period 1700-1820 for Western Europe. Once more, an examination of Ireland runs into the "peephole dilemma". Using a fairly complicated procedure it is possible to elicit approximate infant mortality rates from the 1841 census. For Ireland as a whole, infant mortality was in the neighborhood of 220-225 per thousand life births, with urban rates far in excess of rural rates and the poorer provinces (Munster and Connacht) having higher rates than Leinster and Ulster. The findings show that infant mortality in Ireland was higher than the rates indicated by family reconstitution studies in other countries. By the middle of the nineteenth century infant mortality in Western Europe (with the exception of Germany) hovered between 150 and 160 per thousand.[46] There is some evidence that infant death rates were beginning to decline in the decades

prior to the Famine.[47] Still, the high infant mortality rates partially neutralized the high birth rates, and serve as a reminder of the comparative backwardness of Irish society before the Famine.

The history of disease and morbidity in prefamine Ireland was a complete terra incognita before Connell's pioneering work on the subject. He found little evidence that the history of "fever" (probably typhoid fever and possibly malaria) was of any "assistance in helping the vigour of the growth of population".[48] The effects of other medical factors on population growth were probably small. In 1841 the entire country had 1381 "physicians" and 1469 "surgeons," or an average of one medical person for every 2868 persons. The city of Dublin had one doctor for every 510 persons, while in the province of Connacht there was only one doctor for every 5,791 persons. No statistical association between the number of doctors per capita and infant or general mortality levels could be established.

A similar point can be made about hospitals. In 1841 there was a total of 150 infirmaries, general hospitals and fever hospitals. Connell was not quite correct in arguing that there were too few of these hospitals to have much effect: in the decade before the famine they admitted 623,995 patients. Although how long each patient stayed is unknown, this number is large enough to have had some demographic effect. Nor is it true that these hospitals only helped to spread infectious disease to its hapless inmates: the death rate of hospital patients was on average only 6.6 percent. In addition to the hospitals, there were 631 dispensaries, where the sick received outpatient care for a nominal fee or free of charge. And yet, there seems little room to revise Connell's main conclusion that on balance medical facilities did not reduce mortality by much. The real issue here, as elsewhere in Europe, was less a lack of facilities or medical personnel, than that given the primitive state of medical science, any number of doctors or hospitals was unlikely to have much effect in this period.[49]

The only possible exception to the unimportance of medicine in Irish population growth is the vaccination against smallpox.[50] It is unlikely that vaccination in Ireland had become as extensive as in Britain. Especially in the poorer counties, smallpox remained an important cause of death, especially of children between the ages of 6 months and 5 years.[51]

The third aspect of mortality we need to discuss is the effect of subsistence crises on mortality. It still seems to be agreed upon that the disappearance of high mortality peaks during harvest failures was a primary cause of the resumption of European population growth after 1750. The decline in subsistence crises were not just "caused" by a rising standard of living, they were the rising standard of living.[52]

Did the Irish share in this gradual disappearance of poverty? Most of our discussion here will have to deal with that hardy annual of Irish historiography, the potato. Connell devoted an entire chapter to the influence of the potato and concluded that it was "of quite fundamental importance in permitting and encouraging the rapid growth of population in the sixty or seventy years before the Famine". The same view was expressed in another classic discourse which appeared almost simultaneously with Connell, namely Salaman's book on the history of the potato.[53]

The potato's transition from supplementary kitchen garden crop in one region to staple food and cornerstone of the tillage system was a gradual process. Enjoyed by rich and poor alike, consumption in the nineteenth century reached proportions which are hard to believe today.[54] In 1845 potatoes accounted for about one quarter of the value of agricultural product and one third of the acreage under spade and plough. As is well known, the ability of the potato to produce human food per acre is much larger than grains. That difference in efficiency led Connell and Salaman to claim that the potato operated as an expansion of the resources of the economy and relieve the Malthusian constraints which had kept the population in check before. L.M.

Cullen challenged this interpretation using an implicit Boserup model, in which population growth was exogenous and the diffusion of the potato a response to population pressure rather than a cause of it. It is hard to choose between these two hypotheses both of which are a priori reasonable interpretations of Irish history before the Famine, but attempts to discriminate between them using econometric techniques found no support for Cullen's "population push" hypothesis.[55]

There is a natural inclination to write the potato's history in Ireland in terms of disasters of the nineteenth century, obscuring its earlier role in providing both dietary variety and insurance against shortage. In support of the potato, the food portfolio model spelled out by Connell and Drake has been developed recently. Portfolio theory suggests that even if potato crops were as variable or more variable than grain crops, a combination of both potatoes and cereals would usually be less risky than any single crop. If the acreage under potatoes was between one third and one half of that under grain, the variance of total food production could be cut by about one fifth.[56] This gain is quite respectable: compare McCloskey's computations for the variance-reducing capabilities of the open-field system in England.[57] The portfolio model ignores, however, one cardinal feature: potatoes were primarily the food of the poor throughout most of the country. Many ate little else, and the fact that its widespread consumption reduced aggregate riskiness may have been of little consolation to them. Moreover, the potato's keeping qualities were poor even after somewhat hardier varieties came into use.[58]

Perishability prohibited the maintenance of buffer stocks, but the absence of such stocks is felt only during major harvest failures. The remarkable fact remains that the potato did not experience a total and disastrous failure between 1739-40 and 1845. Now Connell's claim that the period after 1745 saw a "gap in famines" is an over-simplification. Dickson has chronicled and begun the task of quantifying the crises of 1756-58,

1762-63, and 1770-71, and his work indicates that progress was "gradual and fitful", leading him to surmise that these crises may have been relatively more lethal than the better documented ones of 1800-01 and 1816-18. These are thought to have carried off about 40,000 each, but they pale into insignificance beside the famine of 1740-41.[59] The latter catastrophe occurred when all major food sources failed simultaneously, including the potato. In the decades thereafter, the role of the potato in providing a more plentiful, nutritious, and reliable food cannot be seriously disputed. While the Irish were widely viewed to be wretchedly poor and backward, the numerous comments on their health and good looks are indicative of the quality of the potato diet. Nutritional analysis, pioneered by Connell and confirmed by more recent research, shows that a diet of potatoes and milk contains all the ingredients of a healthy and balanced diet.

Nonetheless, the demographic importance of the potato cannot be accepted without qualifications. It seems hard to accept that the potato was a necessary condition for population growth. As Cullen has pointed out, experience in other countries suggests that population grew as well in those regions in which the potato had not become a staple food, e.g. England. The econometric analysis of the prefamine data suggests that while there is a causal connection from potatoes to population growth, the effect is by no means large enough to account for all the increase experienced after 1750.[60] Furthermore, there is some evidence that the efficiency of the potato as a source of cheap and reliable food was declining in the decades before the Famine. In the absence of production series we have to rely on potato output in other countries, at best a risky procedure.[61] Alternatively, we can rely on the testimony of informed contemporaries on this matter.[62] But if the potato was becoming a less reliable source of food, no major subsistence crises occurred. The local famines which were becoming more frequent were a long shot away from the horrors wrought by phytophtora infestans.

Emigration was another crucial element in Irish population change in the half-century before the Famine. The quantitative aspects have been discussed elsewhere and we shall confine ourselves here to the demographic effects.[63] The basic fact is that in the thirty years between the battle of Waterloo and the onset of the Great Famine, approximately 1.5 million Irish left their country to settle elsewhere, primarily in Great Britain, Canada, and the United States. The direct effect of this unique mass exodus on population growth is obvious enough. Without emigration, the growth of population would have continued to exceed one percent per annum.

Moreover, emigration could also have affected the demographic behavior of those who did not emigrate. As has been often observed before, emigrants were not a representative sample of the population: 70 percent of the emigrants were clustered in the age bracket 16-34, as opposed to 35 percent of the population covered by the 1841 census. Emigration thus removed the biologically reproductive more than others, and clearly this must have influenced the birth rate. Emigration might also explain, at least partially, the decline in the propensity to marry in the prefamine decades. Another mechanism by which emigration could affect marriage is by creating imbalances in the sexual composition of the population. Samples of emigrants from shipping lists show that the ratio males to females aged 15-34 was 58.6:41.4 for Boston and 57.6:42.4 for New York.[64] Statistical analysis suggests, however, that the second-round effects of emigration on population growth were not very large. It is possible to compute county-by-county emigration rates for the period 1821-41 using a residual method first outlined by Cousens.[65] Holding other things equal, we ought perhaps to observe a negative association between emigration and birth or marriage rates. Attempts to find that relation have thus far been unsuccessful.

IV

The sheer size of the emigrant flow on the eve of the Famine and in its aftermath provide some tantalizing hints as to the shape of that might-have-been world, an Ireland without the Great Hunger. In the event, emigration, celibacy, and postponed marriage led to a century of population decline. Only in recent years has Ireland reassumed its old place a the top of the league in west European population growth. Post-famine demographic patterns have fascinated and puzzled researchers too, but it must be said that they have as yet not produced a Connell. As for the period surveyed here, three decades of debate have not exhausted the questions raised by Connell. Many of the most interesting issues --- the regional dimension, the role of rural industry, the importance of religious factors, the extent of pre-famine adjustment to population pressure, the economic and social determinants of fertility and nuptiality --- remain controversial. Nonetheless there has been enough useful and stimulating research, we submit, to justify this lengthy review.

FOOTNOTES

1. Some interesting studies using parish records for Ireland have been carried out, but they tend to be concentrated in the North and use primarily Church of Ireland records, which may not reflect the demographic characteristics of the Catholic majority. In any event, the smallness of the sample prohibits any generalization from them. See for example V. Morgan, "A Case Study of Population Change over Two Centuries: Blaris, Lisburn 1661-1848", Irish Economic and Social History, III (1976), pp. 5-16; idem, "The Church of Ireland registers of St. Patrick, Coleraine, as a source for the Study of a local Pre-famine Population", Ulster Folklife Vol. XIX (1973), pp. 56-67.

2. The fire at the Public Record Office of Dublin in 1922 destroyed almost all enumerators' returns of the censuses of 1821 to 1851, and historians have had to work from scraps that were rescued by fluke. A list of the available material can be found in Stephen A. Royle, "Irish Manuscript Census Records: a Neglected Source of Information", Irish Geography, Vol XI (1978), pp. 110-125. Recent studies using this material include Francis J. Carney, "Household Size and Structure in Two Areas of Ireland, 1821 and 1911", in L.M. Cullen and F. Furet (eds.), Ireland and France, 17th-20th Centuries: Towards a Comparative Study of Rural History (Paris, 1980), pp. 149-66; Kevin O'Neill, "Family and Farm in pre-Famine Cavan" (Unpublished Ph. D. Dissertation, Brown University, 1979).

3. K.H. Connell, "Some Unsettled Problems in English and Irish Population History", Irish Historical Studies Vol. VII, No. 28 (Sept. 1951), pp. 225-34. Peter E. Razzell, "Population Growth and Economic Change in Eighteenth Century England and Ireland", in E.L. Jones and G.E. Mingay, eds., Land, Labour and Population in the Industrial Revolution(London, 1967).

4. K.H. Connell, The Population of Ireland (Oxford, 1950). Idem, "Land and Population in Ireland", Economic History Review second series, Vol II, No. 3 (1950), pp. 279-289.

5. B.R. Mitchell and Phyllis Deane, Abstract of British Historical Statistics (Cambridge, 1971), p. 5.

6. See, for instance, George A.P. O'Brien, The Economic History of Ireland from the Union to the Famine (London, 1921), pp. 9-12.

7. Connell, The Population of Ireland, pp. 9-25.

8. Stuart Daultrey, David Dickson, and Cormac O Grada, "Eighteenth Century Irish Population: New Perspectives from Old Sources", Journal of Economic History, Vol. XLI No. 3 (Sept. 1981), pp. 601-628.

9. Daultrey, Dickson and Ó Gráda, "Eighteenth Century Irish Population", pp. 619-621. See also Leslie A. Clarkson, "Irish Population Revisited, 1687-1821", in J.M. Goldstrom and L.A. Clarkson, eds., Irish Population, Economy, and Society (Oxford, 1981), pp. 13-35.

10. Cormac Ó Gráda, "Demographic Adjustment and Seasonal Migration in Nineteenth Century Ireland", in L.M. Cullen and F. Furet, eds., Ireland and France, 17th-20th centuries, p. 184.

11. Louis M. Cullen, "Population Trends in Seventeenth Century Ireland", Economic and Social Review (Dublin), Vol. VI (January 1975), pp. 149- 165. Nicholas Canny, "Early Modern Ireland: an Appraisal Appraised", Irish Economic

and Social History, Vol. IV (1977), pp. 56-65. Cullen's starting point of 2.8 million in 1712 led him to postulate a figure of 1.4 million for 1600.

12. David Dickson, Cormac Ó Gráda and Stuart Daultrey, "Hearth Tax, Household Size, and Irish Population Growth, 1680-1800", Proceedings of the Royal Irish Academy, 82 (1982), pp. 162-169.

13. J.J. Lee, "On the Accuracy of the Prefamine Irish Censuses", in Goldstrom and Clarkson, eds., Irish Population, Economy, and Society, pp. 52-54. Phelim P. Boyle and Cormac Ó Gráda, "Fertility Trends, Excess Mortality, and the Great Irish Famine", unpublished paper, University of British Columbia, 1982. A comparison of the 1831 census returns with the 1834 religious census appears, on the other hand, to support the contention that the 1831 census was biased upwards. Cf. Joel Mokyr, Why Ireland Starved: A Quantitative and Analytical History of the Irish Economy (London, 1983), p. 31.

14. Frank J. Carney, "Pre-Famine Irish Population: the Evidence from the Trinity College Estates", Irish Economic and Social History, (1975), pp. 35-45. For a critique of Carney, see Lee, "On the Accuracy", pp. 55-56.

15. See Connell, The Population of Ireland, pp. 238-241, and idem, "Some Unsettled Problems".

16. Reports of the Commissioners for Inquiry into the Condition of the Poorer Classes in Ireland (P.P. 1836, XXX-XXXIV)

17. Reports of the Commissioners Appointed to Take the the Census of Ireland for the year 1841 (P.P. 1843, Vol. XXIV)

18. Michael Drake, "Marriage and Population Growth in Ireland, 1750-1845", Economic History Review second series, Vol. XVI, No. 2 (1963), pp. 301-313.

19. Henry D. Inglis, A Journey Throughout Ireland during the Spring, Summer, and Autumn of 1834 (London, 1835), Vol. I, p. 247. See Census of Ireland, p. 202.

20. Michael W. Flinn, The European Demographic System, 1500-1820 (Baltimore, 1981), pp. 124-127.

21. Peter Laslett, The World We Have Lost (New York, 1965), pp. 81-89.

22. K.H. Connell, "Marriage in Ireland after the Famine: the Diffusion of the Match," Journal of the the Statistical and Social Inquiry Society of Ireland, Vol. XIX (1955), p. 102.

23. Cf. Mokyr, Why Ireland Starved, pp. 71-72.

24. William Petty, The Economic Writings of Sir William Petty, ed. by C.H. Hull (Cambridge, 1899), p. 608. Louis M. Cullen, The Emergence of Modern Ireland, 1600-1900 (London, 1981), p. 83. Cormac Ó Gráda, "Irish Population Trends, 1700-1900: A Survey", unpublished manuscript, 1981.

25. David Dickson, "A Note on the Cromwellian Transplantation Certificates" (unpublished paper, Trinity College Dublin, 1982). See also Public Record Office of Northern Ireland, T 808/15038; J.P. Prendergast, The Cromwellian Settlement of Ireland, 2nd ed. (Dublin, 1975), pp. 363-76.

26. Connell, The Population of Ireland, p. 30.

27. Mokyr, Why Ireland Starved, Ch. 3, esp. pp. 64-68.

28. E.A. Wrigley, Population in History (London, 1969), p. 159.

29. Coale's measures are based on the Hutterite fertility schedule, comparing the propensity to marry and the fertility rates with the Hutterite levels, reputed to be amongst the highest achieved. Thus, for instance, the value of I_f is equal to total births divided, not by the total number of women aged 17-44, but by the sum of the number of women in each age cohort weighted by a set of weights F_i taken from the Hutterite fertility schedule. The interpretation of I_g is the number of births Irish women would have had if she had been subject to Hutterite fertility. The advantage of calculating Coale's measures is primarily that the Princeton group computed a large number of these measures for other countries, so that comparisons of these standardized measures are easily carried out. The original source for these measures is Ansley Coale, "Factors Associated with the development of Low Fertility: an Historic Summary", U.N. World Population Conference, 1965, Proceedings (New York, 1967), pp. 205-209.

30. For instance, the value of I_m for France in the 1840s was .52, for Belgium .375 in 1846, and in England .49, while the values of I_g (marital fertility) were .53 (France), .65 (England and Wales), and 0.76 (Belgium). For sources and additional details, see Mokyr, Why Ireland Starved, p. 36.

31. Boyle and O Grada, "Fertility Trends".

32. Cormac Ó Gráda, "Pre-Famine Dublin's Demography: Evidence from the Rotunda", paper presented at the Economic and Social History Society of Ireland

Conference, Cork, 18 September 1982.

33. Mokyr, Why Ireland Starved, pp. 34-37, 55-57.

34. Drake, "Marriage and Population Growth", pp. 312-313.

35. D.E.C. Eversley, "The Demography of the Irish Quakers, 1650-1850", in Goldstrom and Clarkson, eds., Irish Population , pp. 68-71. United States Immigration Commission, Reports: Fecundity of Immigrant Women (Washington, 1911; repr. New York, 1970), pp. 805-8; H.H. Golden and J. Wilcox, "Prolific Immigrants and Dwindling Natives? Fertility Patterns in Western Massachusetts, 1850 and 1880", Journal of Family History Vol. 7 (1982), pp. 265-88.

36. Connell, The Population of Ireland, p. 49.

37. David W. Miller, "Irish Catholicism and the Great Famine", Journal of Social History Vol. IX No. 7 (Sept. 1975), pp. 81-104.

38. Illegitimacy in Ireland was shown by Connolly to average about 2.5 percent of live births, less than half the proportion for Britain. See Sean J. Connolly, "Illegitimacy and pre-nuptial pregnancy in Ireland before 1864: the evidence from some Catholic parish registers", Irish Economic and Social History, Vol. VI (1979), pp. 5-23. For a survey on nineteenth century sexual morality in Ireland, see Connell, The Population of Ireland, pp. 47-49.

39. See for instance Jean-Louis Flandrin, Families in Former Times (Cambridge, 1979), pp. 223-224.

40. Arthur Young, Arthur Young's Tour in Ireland, 1776-79, ed. by A.W. Hutton (London, 1892, orig. pub. in 1780), Vol. I, p. 120. See also Horatio Townsend, A General and Statistical Survey of the County of Cork (Cork, 1815), Vol. I, p. 90.

41. Eric Almquist, "Prefamine Ireland and the Theory of European Proto-industrialization", Journal of Economic History, Vol. XXXIX, No. 3 (Sept. 1979), pp. 699-718.

42. Cf. for example Yoram Ben Porath, "Child Mortality and Fertility: "Issues in the Demographic Transition of a Migrant Population", in R. Easterlin, ed., Population and Economic Change in Developing Countries (Chicago, 1980), pp. 72-96.

43. Mokyr, Why Ireland Starved, p. 35.

44. Connell, The Population of Ireland, p. 240.

45. Flinn, European Demographic System, pp. 91-101. Ronald Lee, "British Population in the Eighteenth Century", in Roderick Floud and Donald N. McCloskey, eds., The Economic History of Britain since 1700 (Cambridge, 1981), Vol. I, pp. 23-26.

46. Mokyr, Why Ireland Starved, pp. 37-38.

47. Morgan, "A Case Study", pp. 15-16; idem, "The Church of Ireland Registers", p. 61.

48. Connell, The Population of Ireland, p. 237.

49. Thomas McKeown and R.G. Brown, "Medical Evidence Relating to English Population Change in the Eighteenth Century", Population Studies, Vol. IX (Nov. 1955), pp. 119-141. Thomas McKeown, The Modern Rise of Population (London, 1976). While architecture and medical biography have been well served by histories of Irish hospitals --- O'Donel T.D. Browne, The Rotunda Hospital, 1745-1945 (Edinburgh, 1947) is a good example --- their records have been largely neglected by economic historians.

50. Razzell, "Population Growth and Economic Change". Idem, The Conquest of Smallpox (Firle, Sussex, 1977).

51. In parts of the more developed Eastern seaboard, smallpox was on the decline. In the city of Dublin only 3 percent of all deaths was attributed to smallpox and in co. Wicklow the figure is 2.3%. In the rest of the county, however, smallpox still accounted for 5-6% of all deaths. Smallpox remained an important cause of death of Irish children, and the high child death rates in Ireland reflect its continuing effect. For instance, smallpox accounted for 13.3% of all deaths under five in Connacht, and 8.4% in Leinster.

52. This argument is developed in some detail in Joel Mokyr, "Industrialization and Poverty in Ireland and the Netherlands", Journal of Interdisciplinary History Vol. X, No. 3 (Winter 1980), pp. 429-458.

53. Connell, The Population of Ireland, p. 159. Redcliffe N. Salaman, The History and Social Influence of the Potato (Cambridge, 1949).

54. See for instance P.M.A. Bourke, "The Use of the Potato Crop in Prefamine Ireland", Journal of the Statistical and Social Inquiry Society of Ireland Vol.

XII (1968), pp. 72-96. Cullen, The Emergence of Modern Ireland, pp. 144-147, 158-161. N.J.A. Williams, Pairlement Chloinne Tomáis (Dublin, 1981), p. xix is interesting on the early use of the potato in the province of Munster.

55. L.M. Cullen, "Irish History Without the Potato", Past and Present, 40 (1968), pp. 72-83; Joel Mokyr, "Irish History With the Potato", Irish Economic and Social History, Vol. VIII (1981), pp. 8-29.

56. Daultrey, Dickson, and Ó Gráda, "Eighteenth Century Irish Population", pp. 628n. Joel Mokyr, "Uncertainty and Prefamine Irish Agriculture", in T.M. Devine and David Dickson, eds., Ireland and Scotland, 1600-1850 (Edinburgh, 1983), pp. 92-94.

57. Donald N. McCloskey, "The Economics of Enclosure: A Market Analysis", in William N. Parker and Eric L. Jones, eds., European Peasants and their Markets (Princeton, 1975).

58. See especially Elizabeth Hoffman and Joel Mokyr, "Peasants, Potatoes and Poverty: Transactions Costs in Prefamine Ireland", in Gavin Wright and Gary Saxonhouse, eds., Technique, Spirit, and Form in the Making of the Modern Economies: Essays presented to William N. Parker (Greenwich, Conn., 1984, forthcoming).

59. David Dickson, "Famine in Ireland, 1700-1775: A Review" Unpublished Manuscript, Trinity College Dublin, 1981. Cormac Ó Gráda, "Malthus and the Prefamine Economy", in Antoin Murphy, ed., Economists and the Irish Economy from the Eighteenth Century to the Present Day (Dublin, 1984, forthcoming).

60. Mokyr, "Irish History", pp. 23-27. Idem, Why Ireland Starved, pp. 55-57.

61. See Mokyr, "Uncertainty and Irish Agriculture", pp. 93-94.

62. In 1830 James Bicheno told a parliamentary committee that "potatoes are more liable to failure than grain". Report of the Select Committee on the State of the Poor in Ireland (P.P. 1830, Vol. VII), p. 378. William Wilde pointed out in a special appendix to the 1851 census that the season 1813-14 was the "forerunner of other calamities ... a new pestilential constitution now commenced". The Census of Ireland for the year 1851, part V: Tables of Death, Vol. I (P.P. 1856, Vol. XXIX) pp. 502-506. In 1840 Otway wrote that "the health and strength of Irishmen are referred to as a proof of the wholesomeness of the potatoes as an article of food; but the Irishmen are healthy not by, but in spite of, their food". Reports from the Assistant Hand-Loom Weavers' Commissioners on the West Riding and Ireland (P.P. 1840, Vol. XXIII) p. 444. But see Ó Gráda, "Malthus" for contemporary statements in support of the potato.

63. The locus classicus on the subject is still William Forbes Adams, Ireland and Irish Emigration to the New World from 1815 to the Famine (New York, 1967, orig. pub. in 1932). For more recent work see Cormac Ó Gráda, "Across the Briny Ocean: Some Thoughts on Irish Emigration to America, 1800-1850", in Devine and Dickson, Ireland and Scotland, pp. 118-130; Joel Mokyr and Cormac O Gráda, "Emigration and Poverty in Prefamine Ireland", Explorations in Economic History Vol. 19 No. 3 (Sept. 1982), pp. 360-382. Jacques Verrière, La Population de l'Irlande (Paris, 1979), pp. 77-86.

64. Ó Grada, "Across the Briny Ocean", p. 124.

65. S.H. Cousens, "The Regional Variations of Emigration from Ireland between

1821 and 1841", Institute of British Geographers, Transactions No. 37 (Dec. 1965), pp. 15-30. Joel Mokyr, "The Deadly Fungus: an Econometric Investigation into the short-term demographic impact of the Irish Famine, 1846-1851", Research in Population Economics, Vol. II (1980), pp. 237-277.