

SUGGESTIONS AND DEBATES

Rational Choice and a Lifetime in Metal Mining: Employment Decisions by Nineteenth-Century Cornish Miners

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SUMMARY: This article argues that it was primarily cash, rather than culture, that shaped employment decisions by Cornish miners in the mid-nineteenth century. Although their occupation cut their lives short, total lifetime earnings as a metal miner, at home or abroad, exceeded the probable income from readily available alternative employment, even over a longer working life. In economic terms, Cornish miners rationally sold part of their lives for both higher short- and long-term incomes.

The general subject of this discussion is the perplexing question of the motivations of human behaviour in the market place. In particular, whether labour usually acts as a profit maximizer in the choice of occupations, possibly trading quality of life for higher cash incomes, or whether it is constrained in its choice by powerful sociocultural forces that diminish potential lifetime earnings? Clearly, most would agree that there is usually some balance of the two, but the starting assumption here is that there are limits to the effects and duration of the noneconomic influences. Large groups of workers are unlikely to continue, generation upon generation, with a loyalty to an occupation which significantly under-rewards them relative to their effort and the risks accepted, and which reduces their material standard of living below that available from possible alternative forms of employment. From this proposition it would appear appropriate to review any area of labour history where there is a view of sustained under-remuneration and subject it to comparative analysis with performance in other similar or related activities. In this study, the focus will be on British metal miners, with special reference to those in southwest England. They are particularly suitable since they are usually considered to have sustained exceptionally harsh working conditions, for

relatively low pay, over long periods of time, but nevertheless to have demonstrated strong occupational loyalty, within a context of high and increasing levels of geographical mobility. Nowhere are the sociocultural forces given greater stress in explaining this performance – but nowhere are they less necessary.

The established social history of Cornish miners in the nineteenth century embraces a view that: (a) the nature of their labour made their lives particularly “nasty, brutish and short”; (b) that highly volatile earnings levels frequently plunged them into abject poverty – an increasingly common circumstance as British nonferrous metal mining contracted sharply after the 1860s, and (c) that they were trapped into a continuing involvement with this industry by environmental and hereditary forces that wove together traditional independence of spirit, local allegiances, clannishness, and a nationalistic “one and all” mentality, into unbreakable cultural bonds.¹ Herein is also found the explanation for the mass overseas migration of Cornish miners in the last part of the nineteenth century, as they sought similar employment through filial connections and closely-tied communities in grim mining districts across the world, rather than assimilating into other industries and industrial communities elsewhere in England. These nonutility maximizing behaviour patterns and their explanation fit conveniently into broader sociological theories about the dynamics of mining communities. Bulmer writes, for example, that the maintenance and persistence of an occupational community of miners may be due to a range of sociological factors,

[...] such as constituting a separatist group, the development of an occupational identity of miners, and its re-enforcement by a multiplex pattern of social relationships in which work and non-work spheres overlap. The *gemeinschaftlich* ties to kinship, residence and friendship may help to bond an ongoing local pattern of social interaction which may in time even become relatively autonomous in relation to the dominant local economic activity.²

It will be argued here, however, that this view of the miners’ condition is not well supported by the evidence and that complex “cultural entrapment” explanations of their continuing attachment to the industry may be largely unnecessary. Comparative analysis of the health and earnings of Cornish miners with other similar labouring groups, will show that: (a)

1. There is no theoretical discussion of the cultural context of Cornish emigration but its most commonly accepted characteristics are outlined in the introduction to John Rowe, *The Hard-Rock Men: Cornish Immigrants and the North American Mining Frontier* (Liverpool, 1974). See also A.K. Hamilton Jenkin, *The Cornish Miner*, 2nd ed. (London, 1948), ch. 4; Arthur C. Todd, *The Cornish Miner in America* (Truro, 1967), pp. 16–19, 24–25; A.L. Rowse, *The Cornish in America* (Redruth, 1967), pp. 16–17; Philip J. Payton, *The Cornish Overseas* (Fowey, 1999), pp. 259–264.
2. M.I.A. Bulmer, “Sociological Models of the Mining Community”, *Sociological Review*, 23 (1975), pp. 61–92.

their occupation did indeed have particularly deleterious effects on health, but that average earnings were relatively high and probably more than compensated for the reduction in the length of their working lives; and (b) that the decision to emigrate to mining districts overseas, rather than other domestic industrial areas, was soundly based on the relative available wage levels. More succinctly, that the choice of a career as a Cornish miner during the second and third quarters of the nineteenth century was a rational economic one and that continued loyalty to the industry was soundly based on economic self-interest. Other cultural issues may have been of significance for individuals but were not an essential and inevitable part of the decision-making process. To demonstrate this proposition, the article will firstly consider the factors influencing the miners' health and safety at work and then compare their record relative to other groups. Thirdly, it will estimate the degree to which miners' working lives were cut short by their occupation and the level of higher wage "compensation" necessary to give them overall lifetime parity of earnings with those groups. Fourthly, it will consider the average earnings which workers and their families could derive from mining in Cornwall relative to other alternative domestic occupations, and finally it will consider the relative economic benefits to be gained from emigration to mining occupations abroad. The conclusion will evaluate the relative importance of rational economic choice and sociocultural influences in shaping continued employment decisions by miners and suggest that while the latter might be necessary for that explanation, the former is sufficient in itself.

MINERS' HEALTH AND SAFETY

In the mid-eighteenth century, contemporary commentators do not appear to have regarded metal mining as a particularly unhealthy occupation.³ At that time, the majority of mines were still relatively shallow, ventilation was reasonably good, the use of gunpowder for breaking rock, with its attendant debilitating fumes, was still in its infancy. More particularly, however, underground labour was still limited in duration and work intensity, and periodic in its regularity, so that the damage that it inflicted on miners' health was ameliorated and delayed.⁴ A century later the situation had changed dramatically. The application of steam power for pumping had enabled mines to become much deeper – and consequently more hazardous to health. Ventilation had deteriorated; fume and bad air accumulation from blasting, poor candles, pipe smoking and, occasionally, carbon dioxide gas seepage, had greatly increased; time

3. Jenkin, *Cornish Miner*, p. 224.

4. John Rule, "The Labouring Miner in Cornwall, c. 1740–1870: A Study in Social History", (Ph.D. thesis, University of Warwick, 1971).



Figure 1. Cornish miners using a rock drill at the Carn Brea tin mine; ca 1900. The rock drill was dubbed the “widowmaker” by the miners, who recognized the deleterious health effects of increased dust from its use.

Originally published in the Report on the Health of Cornish Miners, 1904, p. 13.

and physical effort in accessing working places was extended; dangers from blasting, falling, and collapses in larger and more complex working areas, rose inexorably. During the last quarter of the century, the introduction of dry-drilling “widowmaker” machines increased these problems exponentially. Above all, the length and regularity of miners’ work in these deteriorating conditions had increased as the labour force had become progressively proletarianized and disciplined to raise output and productivity in more heavily capitalized operations. These problems were encountered in metal mining districts throughout Britain but were particularly serious in the deep mines of Cornwall – and were later replicated in mining districts across the world as the scale and complexity of operations increased.⁵

5. Alan Derickson, *Workers’ Health, Workers’ Democracy: The Western Miners’ Struggle, 1891–1925* (Ithaca, NY, 1988), pp. 28–56; D. Dinsdag and H. Lee. “Avoiding Unnecessary Interference: The Coal Fields Inspectorate in New South Wales and British Columbia, 1854–1912”, *The Mining History Journal*, 5 (1998), pp. 76–88; Elaine Katz, *The White Death: Silicosis on the Witwatersrand Gold Mines, 1886–1910* (Johannesburg, 1994).

All these problems in metal mining were also encountered, on an even larger scale, in the coal industry. From the second quarter of the nineteenth century, the conditions in that sector began to attract increasing parliamentary attention, mainly because of two additional characteristics, little known in metal mining – viz. headline-catching mass disasters, usually resulting from the ignition of methane gas (rarely encountered in metal mines) and the large-scale employment underground of women and children. The latter outraged the moral sensibilities of the Victorian middle class, while the former focused the need for action. Almost all the early investigative activity and legislation on matters of health and safety in mining – such as the Select Committee on Accidents in Mines (1835), the Royal Commission on the Employment of Children in Mines (1842), and the Coal Mines Regulation Acts of 1860 and 1868 – was directed at the coal industry, with issues relating to metal mining treated as a minor adjunct. It was another twenty years before metal mining saw its own enquiry, with a Royal Commission under Lord Kinnaird reporting in 1864.⁶

The Kinnaird Commission interviewed over 120 witnesses, including medical men, managers, agents, owners and miners, and assembled a wide range of evidence on all aspects of the working of the industry, from underground to surface labour.⁷ It elaborated on, and extended, much that had been revealed in the earlier enquiries and provided a clear snapshot of working conditions in the industry at the peak of its prosperity around the mid-century, before the rapid slide into decline during the next few decades. The final report is revealing in the detail that it provides on the average length of miners' employment underground, the forms of debilitating disease encountered, attitudes towards danger and risk, and many other aspects of labour in mines.

The principal, well-understood, cause of long-term damage to miners health was working in fouled and oxygen-depleted air. This had a direct detrimental effect on the functioning of their lungs, while sustained exertion shovelling, drilling and climbing ladders, indirectly led to a sharp increase in the incidence of heart disease.⁸ Similarly, long exposure to wet, humid and hot conditions and a failure by many mines to provide changing facilities before a long walk home, caused severe rheumatism in the lower limbs of many older miners.⁹ The effects of working under these

6. *Report of the Commissioners Appointed to Inquire into the Condition of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. C 151 Do Not Apply*, British Parliamentary Papers 1864, 24 (i), 371 (ii):1 (hereafter the *Kinnaird Commission*).

7. For an account of the background to the Kinnaird Commission and its activities, see Christopher J. Schmitz, "Cornish Mine Labour and the Royal Commission of 1864", *Journal of the Trevithick Society*, 10 (1983), pp. 30–45.

8. T.A. Morrisson, *Cornwall's Central Mines: The Northern District, 1810–1895* (Penzance, 1980), p. 38, and Roger Burt, *The British Lead Mining Industry* (Redruth, 1984), p. 187.

9. *Kinnaird Commission*, (ii), pp. 33–35. See also C.J. Hunt, *The Lead Miners of the Northern Pennines in the Eighteenth and Nineteenth Centuries*, (Manchester, 1970), ch. 10.

conditions also undoubtedly contributed to the high accident rate in metal mines. Although not faced with the ever-present fear of mass disasters from the ignition of explosive gas, the number of individual or personal accidents experienced by tired and ill men made the industry a highly dangerous place to work. Fumbled shot-firings, ill-considered roof supports, and falls from ladders brought a predictable end to the lives of many older and exhausted miners.¹⁰ Though the long- and short-term dangers of their occupation were high, there appears to be little question that the miners were readily prepared to accept them as an inevitable part of their employment. Employers rarely found it difficult to find men who were prepared to work in the most poorly ventilated “blind ends” – particularly if they were prepared to pay premium wages – and the young often deliberately courted disaster by cutting corners on safety and racing on ladders. As in many other high-risk activities, many no doubt convinced themselves that it “wouldn’t happen to them” and held close to stories of the few who had survived and lived to a ripe old age.

LIFE-SHORTENING EFFECTS OF MINING

Rising concern about the declining standard of miners’ health promoted a number of careful and well founded enquiries into the subject, starting with several sponsored by the Royal Cornwall Polytechnic Society in the 1830s and continuing through the mid-century, with parallel parliamentary investigations in the 1840s and 1860s.¹¹ They all produced a wealth of

10. For an indication of the relative importance of these causes of accidents, see Christopher J. Williams, “Accidents in the Flintshire and Denbighshire Lead Mines”, *British Mining*, 57 (1996), pp. 92–105; and R. Alan Williams, “The High Mortality Rate of British Metal and Slate Miners and Beliefs about Their Causes”, *British Mining*, 34 (1987), pp. 18–33. See also L.D. Langton and J.K. Martin. “Technological Advance, Organisational Structure, and Underground Fatalities in the Upper Michigan Copper Mines, 1860–1929”, *Technology and Culture*, 28 (1987), pp. 42–66.

11. C.C. Carlyon, “On the Diseases Peculiar to Miners”, *Royal Cornwall Polytechnic Society Annual Report* (1835), pp. 33–43; R. Lanyon, “On the Various Diseases of Miners, Their Causes and the Best Practical Means of Remedying Them”, *Royal Cornwall Polytechnic Society Annual Report*, (1836), pp. 35–53; R. Lanyon, “On the Diseases of Miners”, *Royal Cornwall Polytechnic Society Annual Report*, (1838), pp. 35–67; R. Blee, “An Enquiry into the Comparative Longevity of Mining and Other Districts in the County of Cornwall”, *Royal Cornwall Polytechnic Society Annual Report*, (1838), pp. 68–80; R. Blee, “On the Comparative Longevity of Cornish Miners”, *Royal Cornwall Polytechnic Society Annual Report*, (1847), pp. 12–18; R.Q. Couch, “A Statistical Investigation into the Mortality of the Miners in the District of St Just-in-Penwith”, *Royal Cornwall Polytechnic Society Annual Report*, (1857), pp. 1–40; R.Q. Couch, “A Statistical Enquiry into the Mortality of Miners in the District of Lelant”, *Royal Cornwall Polytechnic Society Annual Report*, (1858), pp. 1–38; R.Q. Couch, “A Statistical Enquiry into the Mortality of Miners in the District of St.Ives and the Agricultural Population of the District of St. Buryan”, *Royal Cornwall Polytechnic Society Annual Report*, (1859) pp. 30–75; R.Q. Couch, “On the Mortality of Cornish Miners in the District of Marazion”, *Royal Cornwall Polytechnic Society Annual Report*, (1860), pp. 18–40; R. Blee, “On the Comparative

Table 1. *Percentage of male deaths by age group in two Cornish parishes (from the 1831 census)*

Parish	% of total male deaths in ten years by age group							Total deaths	% of all male deaths
	10–20	20–30	30–40	40–50	50–60	60–70	70–80		
Probus	3.0	9.9	4.5	6.5	9.1	6.8	18.3	131	19.4
Gwennap	7.6	8.0	7.5	10.0	11.0	6.2	5.1	804	19.6

Source: Children's Employment Commission, Appendix, Pt 1, 741.

comparative statistical material that provides a firm foundation for estimating the overall health and increased mortality costs of the miners' occupation. Only a small sample of that data can be used here, but some of the principal material presented by the parliamentary enquiries of the period serves to illustrate the impact that a working life spent underground could have on Cornish males. Robert Blee, for example, drew on the 1831 census to compare male death rates in various age groups for a number of mining and nonmining parishes. Table 1 reproduces some of his findings for just two parishes; Probus, described as "an almost exclusively agricultural parish" and Gwennap, similar in size to Probus but having a large majority of its population engaged in mining. Whereas, in Probus nearly a fifth of the population lived beyond their three score years and ten, in Gwennap only five per cent survived to that age, with considerably higher levels of mortality during their thirties and forties.

Opportunities for the comparison of mortality levels by occupational group became more detailed after the introduction of the Registration of Deaths in 1837. Thus Blee was able to separate the mortality of miners and other nonmining labour in these parishes for two years at the end of the decade. He showed that within Gwennap, for example, the average age of death for miners over the age of thirty was around forty-six years, compared with sixty for nonminers and sixty-four for females. Around sixteen per cent of miners' deaths were caused by violent accidents in the mines. A wider analysis by Lanyon for twelve mixed parishes for the same period slightly narrowed the gap between the two occupational groups to an average age of death for miners of 50.5 years and other labourers of 56.5 years.¹²

Health and Longevity of Cornish Miners", *Royal Cornwall Polytechnic Society Annual Report*, (1871), pp. 47–61. See also William Farr, *Vital Statistics* (London, 1885, reprinted Metuchen, NJ, 1975), pp. 405–411.

12. *Report of the Commissioners on the Employment of Women and Children in Mines*, British Parliamentary Papers, 1842, 15, 1; 16, 1; 17, 1. (hereafter the *Children's Employment Commission*). This reference 16, p. 742. A recent comparative analysis of the mortality of metal miners and agricultural workers in and around Swaledale, Yorkshire, indicates very similar results. See T.B. Bagenal, "Mortality Rate Estimates of Gunnerside Lead Miners from the Census", *British Mining*, 59 (1997), pp. 79–88.

The detrimental effects of underground employment appear to have moderated slightly by the middle decades of the century. Evidence prepared for the Kinnaird Commission by William Farr from the 1861 Census suggested that the mean duration of the life of Cornish miners over the age of twenty was thirty-five years. This compared poorly with a mean duration of forty-three years for other male labourers over the age of twenty in the “healthy” districts of England but rather well with a mean duration of just thirty-one years in some coal mining districts, such as Merthyr Tydfil. This may partly explain the Cornish miners’ prejudice against occupation mobility to that other branch of mining – things were bad enough where they were without making them worse. After the age of forty, the detrimental affects of the years spent underground became even more obvious, with the gap between miners’ future life expectation and that of those employed in “healthy districts” stretching to twenty and twenty-nine years respectively. In that age group, metal miners experienced the same level of mortality as South Wales coal miners. Overall, Farr concluded that,

[...] the number of miners decreases in Cornwall up to the age of 35 nearly at the same rate as in the country generally; that after 35 they begin to die off more rapidly; and from 45 to 55 they die off in immense numbers, leaving few men to attain the age of 65.¹³

By contrast, the nonmining male population of Cornwall enjoyed a level of mortality similar to that of the other “healthy” districts of England and, overall, they had become healthier and slightly extended their average life span since the 1840s. The health and longevity costs of mining, compared with other local occupations, were therefore significant and clearly widening.

The analysis of the causes of these exceptionally high death rates among metal miners – found not just among the Cornish, but also lead and copper miners in other parts of the country – became a focus of attention. All studies revealed the particularly high incidence of consumption and other diseases of the lungs. Taking all forms of pulmonary disease together, their impact on miners was greater, not only than that on the population at large, but also Welsh and Durham coal miners. Nowhere was the matter worse than in Cornwall. In noting that the number of deaths from lung disease in metal mines was nearly three times higher than in Durham coal mines, Farr concluded that the cause must have been due to more than the fact of underground labour alone – i.e. to the particular circumstances in Cornish mines, of long ladder climbs and working in poorly ventilated, fume-filled areas. Only in intestinal diseases, such as cholera, diarrhoea, and possibly fever, did the Cornish miners fare better than the average,

13. *Kinnaird Commission*, (ii), pp. 154–158.

Table 2. *Causes of death among 10,000 males over 15 years old, 1860–1862*

Cause of death	All English occupations	Cornish metal miners	Durham coal miners	South Wales coal miners
Diarrhoea and cholera	547	230	1,255	1,915
Fever	426	324	307	782
Heart disease and dropsy	928	484	928	333
Consumption	1,523	4,439	948	1,604
All lung disease	2,866	5,596	1,958	3,037
Accident and violence	532	782	1,312	2,158
Lung disease and violence	3,498	6,378	3,270	5,195

Source: Kinnaird Commission BPP 1864, 24, Pt 2, 172

reflecting the apparently superior public health of the relatively small mining/industrial towns of the county. Deaths from accidents were considerably higher than the average for all “other” occupations but significantly less than those in coal mining. Combining accidents with lung disease, however, made Cornish mining one of the country’s most hazardous occupations. (See Table 2.)

In searching for an estimate of the overall effect of employment in Cornish mines on life expectancy relative to other occupation groups, a valuable guide is provided by contemporary actuarial calculations made for life insurance premiums. William Farr produced details of single and annual premiums required to ensure £100 over the whole life term of Cornish miners, compared with all English males and males in the healthy districts, such as nonmining labour in Cornwall. (See Table 3.) The data shows considerable disparities between the three groups, varying as their ages increased. Thus in their early twenties, Cornish miners were required to make a single premium payment for life cover that was ten per cent higher than that charged for the average English male and twenty-two per cent higher than that charged for males in the healthy districts – such as Cornish agricultural labourers. By the time they had reached their early forties, these differentials had increased to sixteen per cent and twenty-seven per cent respectively. Using a standard actuarial formula derived from the sum of a finite geometric series, it is possible to convert these data back into estimates of the expected life-span of the various groups at different age points. Calculations of life expectation at quinquennial points between the ages of twenty and sixty are shown overleaf in Table 4.

A young Cornish male who chose a lifetime’s employment in metal mining could expect just over thirty-three years of further life at age twenty, compared with around forty years in a healthier occupation, such

Table 3. *Earnings from annuities secured on the lives of Cornish miners, compared with all English males and males in the healthy districts. 1864 (£ assuming a rate of interest of 3 per cent)*

Present value of annuity of £1 a year for life (1st payment at age x)			
Age	Healthy district	All England	Cornish miners
20	23.29	22.06	20.87
25	22.41	21.09	19.72
30	21.43	20.01	18.31
35	20.30	18.81	16.63
40	18.98	17.48	14.79
45	17.49	16.01	12.95
50	15.81	14.43	11.24
55	13.98	12.76	9.77
60	12.00	11.02	8.44

Example: The present value of £1 a year, to be paid during the life of a male aged forty living in the healthy districts of England was £18 19s 8d; and the same value taken on an average male life in England generally is £17 9s 6d; while on the life of a Cornish miner aged forty the present value of £1 per annum is only £14 15s 10d.

Source: Kinnaird Commission (ii), pp.170–171.

Table 4. *Life expectancy of Cornish miners, compared with all English males and males in healthy districts, calculated from earnings of annuities secured on their lives (assumed interest rate of 3 per cent)*

Age	Healthy district	All England	Cornish miners
20	40.59	36.68	33.28
25	37.74	33.88	30.30
30	34.84	31.02	26.96
35	31.77	28.11	23.38
40	28.51	25.14	19.84
45	25.16	22.14	16.64
50	21.75	19.19	13.91
55	18.39	16.58	11.73
60	15.10	13.58	9.88

Source: Kinnaird Commission (ii), pp. 170–171.

as local agricultural labour. Expressed another way, his employment in mining would reduce his life expectancy by approximately seventeen per cent compared with what he might have expected in the principle alternative local occupation. The longer he remained in mining, the more his life was shortened compared with alternative forms of employment. By age forty-five and over, his average expectation of life was thirty-six to forty per cent less than those in healthier occupations.

These circumstances were certainly not lost on the miners themselves. Evidence taken by the Children's Employment Commission and the Kinnaird enquiry reveals a labour force very well aware of the life-shortening effects of underground work, and one with a strong pecuniary motivation to accept it.¹⁴ Destitution rather than conspicuous consumption was the clear motivation, and for many there was no choice in trading the future for current income. A number of contemporary observers commented upon it. For example, George Henwood, the resident Cornish reporter for the *Mining Journal* in the late 1850s and a campaigner for the prohibition of young boys from underground labour, wrote of the response of a father who he berated for taking his son underground and destroying his health. "What can a body do now, Sir? Them buddling and trunking machines have near done away with boys at surface: besides he saves me a pound a month." Henwood concluded, "a poor child sacrificed to the idol Gain, and for such a paltry sum".¹⁵ Similarly, J.R. Leifchild, a member of the 1842 Commission, remarked of lead miners, who suffered more than most from the effects of their labour, with stomach as well as pulmonary complaints, "Poor fellows! They know full well what their fate is."¹⁶ The spur of necessity created a culture of earnings maximization, whatever the cost. Of course, none of this was peculiar to Cornish miners alone. Workers in many other industries suffered life-shortening effects from their employment, yet their ranks were sustained or swollen by those who were prepared to mortgage the future. Thus Benson observed of the coal industry that, "above the age of forty almost ALL miners are the subject of chronic bronchitis and asthma", but noted that English migrants continued to pour into South Wales together with longer-distance immigrants from Spain and Italy.¹⁷

MINERS' EARNINGS

On these estimates of the life-shortening effects of underground metal mining, the economic rationality of a choice of employment in that industry can only be demonstrated if total life earnings as a miner were likely to be significantly higher than those available in any alternative "healthy" occupation. At age twenty, for example, a young male would need to expect a life-times' income from mining to be at least twenty per

14. *Ibid.*, pp. 23–30.

15. George Henwood, *Cornwall's Mines and Miners*, R. Burt (ed.) (Truro, 1972), p. 94.

16. J.R. Leifchild, *Cornwall: Its Mines and Its Miners*, 2nd ed. (London, 1857), p. 285. The detrimental effects on health of underground employment in north Pennine lead mines are discussed by Hunt, *Lead Miners*, pp. 210–211.

17. John Benson, *British Coal Miners in the Nineteenth Century: A Social History* (London, 1989), pp. 45, 190.

cent higher than he could have derived from agricultural employment to make the sacrifice of life expectancy financially worthwhile. In practical terms, however, that differential may have been considerably smaller. Other labouring groups, such as agricultural workers, saw their earnings potential fall off as their age increased and their work capacity diminished, and they might experience a few years of near complete retirement before death. Miners, on the other hand, might have enjoyed increasing earnings potential, resulting from their accumulating skill and experience, until near the point of their earlier retirement, and then have died comparatively quickly from the crippling pulmonary diseases that decimated them. In simple financial terms, miners might have expected to draw almost as much earnings potential from their shorter number of years as other labouring groups from their longer working lives. Similarly, during the years of booming tin and copper mining activity in the middle years of the nineteenth century, a career in mining might have appeared to offer greater security and continuity of full employment than many other more tenuous and seasonally variable activities. Certainly mining itself had its frequent ups and downs, inflicting periods of under- and unemployment on the mining communities, but that rhythm was probably no more pronounced than in other parts of the emerging industrial economy and certainly no worse than the insecurities of agricultural employment.

While the potential losses to lifetime earnings from mining employment may have appeared limited at twenty, they undoubtedly increased with age. The longer miners spent working underground the more it shortened their lives, and the greater the wage differential over other forms of employment needed to be to keep them from a change of occupation. This may have been a factor that trapped them in the industry and encouraged them to go abroad to seek higher mining wages rather than diversify to other, lower paid domestic occupations. (More of this below.) All in all, young miners can be shown to have made an economically rational choice of employment if their wages were at least twenty per cent higher than those in other local labouring occupations. Older groups would require larger differentials but not of an entirely different order.

These conditions appear to have been met at most points through their working lives, but it is not easy to demonstrate them in simple statistical terms. The principal problem is found in producing a clear index of miners' wages. In most metal mines, not just in Cornwall but worldwide, underground labour was rewarded through piecework contracts that organized miners in groups, or partnerships, and tied their wages to both the intensity and skill of their labour. Not only could these vary, but also the "productivity" of the rock they worked constantly changed – it could become harder or softer, richer or poorer, wetter or more unstable – so that even with constant inputs of the quantity and quality of labour, results could be considerably variable. This was further complicated by variations

between the contract used for different types of underground labour, as well as the length on the contract period. Although some labourers and skilled craftsmen were retained on day wages, most underground labour was divided between those engaged in “dead work” – driving tunnels and sinking shafts – and those involved in production – breaking the ore from the veins in working areas known as stopes. The former work was usually set on “tut” contracts, where payment was assessed in terms of the *volume* of material removed, while the latter was set on “tribute” contracts, where the miners were paid in terms of the *value* of the ore they produced.¹⁸ In general, tut contracts were expected to produce slightly lower wages than tribute, which was regarded as the more skilled of the mining operations, but tribute contracts could be extremely volatile, producing high returns one day, and little or nothing another. Some workers preferred to remain on tut rather than graduate to tribute because of the greater reliability and predictability of earnings.¹⁹ The tut and tribute contracts were agreed with self-organizing partnerships of workers and were established on periodic “setting days”, usually several months apart.²⁰ Each partnership took a specified pitch, at rates which varied with the difficulties of working that area, but which were supposed to produce roughly equivalent earnings at the end of the contract period. If the character of the ground changed irreversibly during the period of the contract, the partnership could be a net winner or loser in final settlements.²¹ Final earnings could thus vary considerable between groups and individual miners even on the same kind of contract. Thus at the large Consolidated Mines in the late 1830s, the lowest monthly earnings of partners in tutwork contracts was £2 13s 11d while the highest was £4 5s od. The spread for tributers was from £3 7s od to £4 12s od.²²

On top of these general causes of wage variations between group, there were also other site-specific causes of variations between mines. Some ventures might be profitable and expanding, anxious to attract labour with

18. J.A. Phillips and J. Darlington, *Records of Mining and Metallurgy: or Facts and Memoranda for the Use of the Mine Agent and Smelter* (London, 1857), pp. 245–249. The efficiency of this “piecework” system of employment attracted the attention of contemporary utilitarian economists. See Charles Babbage, *On the Economy of Machinery and Manufactures*, 4th ed. (London, 1835), Section 307; John Rule, “The Perfect Wage System? Tributing in the Cornish Mines”, in John Rule and Roger Wells (eds), *Crime, Politics and Popular Politics in Southern England 1740–1850* (London, 1997), pp. 53–65.

19. Joseph Y. Watson, *A Compendium of British Mining* (London, 1843), pp. 13–15.

20. Henwood, *Mines and Miners*, pp. 9–12.

21. Leifchild, *Mines and Miners*, pp. 143–148.

22. John Taylor, “On the Economy of Mining”, *Quarterly Mining Review*, 10 (1837), pp. 261–272, reprinted in Roger Burt (ed.), *Cornish Mining* (Newton Abbot, 1969), pp. 31–48. See also T.A. Morrisson, *Cornwall’s Central Mines: The Southern District, 1810–1895* (Penzance, 1983), p. 280 for variations in earnings on tutwork contracts at West Basset mine in the mid-1860s.

more generous contracts, while others might be contracting and trying to shed labour.²³ Most mines produced a number of different metallic ores in combination and variations in the market prices of the metals they produced could have a marked effect on their fortunes and those of miners who worked in them. Tributers working in stopes producing ores with increasing market prices, for example, might expect to do better at the end of a contract than others working in ores with declining prices. The differences could be considerable. Thus at Wheal Buller, in the summer of 1854, miners working rich and valuable copper lodes averaged an income of £4.66 a month, while those on similar contracts in the tin stopes netted an average of only £2.79 a month.²⁴ Finally, it is important to note that the contracting partnerships were responsible for the cost of the materials they used, such as candles, timber, powder and tools, and mines might vary in the charges that they made for these items.²⁵ Quite apart from their final effect on earnings levels, all of these issues may well have had a direct effect on individuals' decisions to take up employment in the industry. The chance, for example, of occasional bonanza profits for tributers or progression into managerial ranks – in a way rarely paralleled in other industries – might outweigh the more rational expectation of lower incomes and possible poverty.²⁶ At Levant mine in 1874, two tributers on a two-month contract cut an unexpected rich bunch of ore and received £40 each for their eight weeks work. Wages for resident managers at the mines, of which there were many thousands in Cornwall during the mid-nineteenth century, often amounted to more than double the average wages of the most successful underground miners.²⁷

Notwithstanding the considerable variations in miners' pay between partnerships and from one contract to another, there is little doubt that both employers and men had their eye on some "average" that bargains should aspire to achieve.²⁸ Certainly by piecing together average earnings for the entire workforce of a number of large mines over a fifty-year period from the 1830s, a clear pattern emerges that might usefully be treated as a

23. See R.N. Worth, *Historical Notes Concerning the Progress of Mining Skills in Devon and Cornwall* (Falmouth, 1872), p. 58, and Sir Charles Lemon, "The Statistics of the Copper Mines of Cornwall", *Journal of the Statistical Society of London*, 1 (1838), pp. 65–84, reprinted in Burt, *Cornish Mining*, pp. 49–82 for an indication of local wage variations within Cornwall.

24. Morrison, *Southern District*, p. 297.

25. L.L. Price, "West Barbary"; or Notes on the System of Work and Wages in the Cornish Mines" (London, 1891), reprinted in Burt, *Cornish Mining*, pp. 111–206, 148–150.

26. A.K. Hamilton Jenkin, "Tributers – Their Uses and Abuses", *Royal Cornwall Polytechnic Society Annual Report* (1930), pp. 1–12.

27. John Corin, *Levant: A Champion Cornish Mine* (St Ives, 1992), p. 29; Morrison, *Northern District*, p. 209, and *Southern District*, pp. 313, 404.

28. This practice was identifiable in metal mining districts throughout Britain. See Burt, *Lead Mining*, p. 141, and M.C. Gill, *The Yorkshire and Lancashire Lead Mines* (Sheffield, 1987), p. 16.

general indicator of wages in the industry. (See Table 5.) From the 1830s, through the middle decades of the century, the average monthly miners' wage, taking tutmen and tributers together, appears to have hovered around £3 per month, or 15s per week. Generally, tributers seem to have done better than tutworkers, but not by much. However, waves of emigration in the 1840s, '50s and '60s began to cause labour shortages with upturns in trade and a slight upward trend gradually set in at the end of the 1860s, taking the average to nearer £4 a month by the late 1880s. This increase was notwithstanding the increasingly severe problems encountered by the industry during the period, and suggests that the industry was losing labour by migration to expanding mining fields in other parts of the world at a faster rate than jobs were being shed at home. These conclusions have certainly been drawn by other historians of the industry.²⁹

Some further support for estimating average miners earnings levels at around £3 per month at the midcentury can be found in the level of "subsist" payments. With long intervals between pay days, the mine owners' custom of retaining a months wages in hand, and occasional poor out-turns where miners were left with little or no profit to see them through the next contract, it had become common for larger mines to advance their workers a regular weekly sum to meet their basic subsistence requirements. Such "subsist" payments were only made on application, and not given as a matter of right, but had become common in Cornwall by the 1840s. At the end of the contract period, the advances would be reckoned with other deductions to estimate the "bal bills", net sum due to the partnership.³⁰ Sometimes the excess due to the miners would be considerable; sometimes it might be only marginal; occasionally it might be negative, obliging the group to work another contract to clear their debts. But the clear expectation would be that the "subsist" would be less than final wages. It is possible to suggest, therefore, that expected final wages should thus be capable of estimation on a "subsist plus" basis. In general terms, it is unlikely that employers would have accepted a margin of less than ten to twenty per cent between their subsist advances and the miners' expected final earnings, so an inflator on subsist payments of twenty to thirty per cent should provide a conservative indicator of expected average earnings. Random evidence would suggest that this does produce the same kinds of final average earnings estimates as those presented above. In the 1840s and 1850s, for example, subsist payments to

29. Morrison, *Northern District*, p. 39; D.B. Barton, *A History of Tin Mining and Smelting in Cornwall* (Truro, 1967), p. 209; John Rowe, *Cornwall in the Age of the Industrial Revolution*, 2nd ed. (St Austell, 1993), p. 320; Todd, *America*, p. 17; Jenkin, *Cornish Miner*, pp. 332, 342; Corin, *Levant*, p. 29.

30. See *Kinnaird Commission*, 24, (ii), pp.169–70 for examples of "bal bills".

Table 5. *Average monthly earnings from tutwork, tribute and all underground labour in Cornish mines 1837–1890 (£)*

Date	Mine	Tutwork	Tribute	All miners
1834	Crofty	3.25	5.500	
1837	Consolidated	3.575	4.250	
1837	Fowey Consols	2.958	3.354	
1838	Fowey Consols	2.987	3.537	
1849	Fowey Consols	3.805	4.613	
1854	Basset	3.279	3.762	
1859	Seton	2.960		
1859	Seton	3.030		
1861	Buller	3.050		
1863	Dolcoath	3.580		
1863	North Roskear	3.400		
1863	Dolcoath	3.850		
1864	Botallack	3.250	3.250	
1864	Par Consols	3.000	2.480	
1864	Dolcoath			3.310
1864	Providence	2.963	3.562	
1864	Margery	2.666	3.400	
1864	Reeth	2.992	3.342	
1864	North Levant	3.037	3.488	
1870	Dolcoath			3.400
1871	Botallack			3.250
1872–1873	North Roskear	4.500		
1872	Several Mines	3.812		
1873	Several Mines	4.075		
1874	Several Mines	3.679		
1875	Several Mines	3.500		
1875	East Pool	3.350	3.175	
1877	Grenville	3.417		
1881	Levant	3.933	5.225	
1883	Levant			3.750
1885	Dolcoath			4.500
1889	Dolcoath		4.000	4.000
1890	Tincroft			4.124

Sources: Morrison, *Central Mines*; Leifchild, *Cornwall*; Price, *West Barbary*; Lewis, *Richly*; Lemon, "Statistics"; Noall, *Botallack*; Corin, *Levant*; *Kinnaird Commission*, 24, pp. 169–170; Buckley, *South Crofty*, pp. 41–44.

miners were usually around 10s per week, rising to around 15s by the late 1880s.³¹

Finally, and before leaving the issue of miners' earnings, brief attention must be given to the very significant additions made to family budgets by

31. See Denys Bradford Barton, *Essays in Cornish Mining History*, 2 vols (Truro, 1968), vol. 1, pp. 59–60; Jenkin, *Cornish Miner*, p. 206; Burt, *Lead Mining*, pp. 151–153.

the combined monetary income of wives, children and other family members/lodgers working in and around the mines – incomes that might have been forgone by a choice of alternative employment in neighbouring nonmining areas. In general terms, paid employment opportunities for females and children on the mine dressing, and for older boys underground, were good and continued for much of the year.³² At the Great Consolidated Copper Mines in 1836, for example, there were 1,191 women and children employed compared with 833 underground male workers. Women and girls above seventeen years were paid 18s a month; girls of fourteen to seventeen years 15s; girls of twelve to fourteen years 12s; girls of nine to twelve years 8s; boys above twelve years 13s; boys under twelve years, 9s.³³ With increasing regulation of the employment and education of children, together with technical changes in ore dressing that brought more men on to the dressing-floors, these opportunities for the employment of miners' family members decreased relatively, but remained high in absolute terms throughout the third quarter of the century. In 1865, for example, Spargo recorded 513 females and boys employed at Dolcoath mine out of a total labour force of 1204; 231 females and boys compared with 299 men at Botallack; and 182 females and boys at East Pool, compared with 170 men.³⁴

Like miners, wages for these groups appear to have increased slowly over the period, probably just managing to sustain established differentials. Thus, at Levant in the early 1890s, women surface workers received an average of 5s and girls 3s 6d per week.³⁵ With wages of this general order, it is quite possible that a miner's household with two adults and three children working could have had a total income around the mid-century of 25s to 30s weekly, or £6, and perhaps more, per month. While there is no doubting that even the most fortunate families sometimes fell upon very difficult times, and that few were fortunate to avoid serious deprivation at some point during their lives, many miners' families actually lived reasonably well and were better off than those in many other occupations. There is evidence, for example, of considerable accumulated surpluses and savings among mining families, that suggests a standard of living superior to that of many of the country's other labouring groups during this period. Thus Price drew attention to a report to the Children's Employment

32. Henwood, *Mines and Miners*, pp. 118–121; Sharron Schwartz, “No Place for a Woman”: Gender at Work in Cornwall's Metalliferous Mining Industry”, in Philip Payton (ed.), *Cornish Studies*, 8 (Exeter, 2000), pp. 69–96.

33. Leifchild, *Mines and Miners*, pp. 174–175; J.A. Buckley, *A History of South Crofty Mine* (Redruth, 1981), p. 51.

34. Thomas Spargo, *The Mines of Cornwall: Statistics and Observations*, 6 vols (London, 1865, repr. Truro, 1960), vol. 2: *The Camborne Area*, pp. 4, 18, 20.

35. Corin, *Levant*, p. 29.

Commission in 1842 that over a quarter of a million pounds was deposited in savings banks in Cornwall, two thirds of which was supposed to belong to miners. He further observed that the Kinnaird Commission had heard in 1864 that a quarter of the population of Camborne, one of the largest towns in Cornwall, lived in houses that were the property of labouring miners.³⁶ Much of this apparent accumulated wealth may have been the result of the odd fortunate bargain, remittances sent or brought home by miners who had made good wages in foreign mining fields, or even be the product of an unusual zeal for thrift and temperance in a society deeply affected by Methodism.³⁷ But much was equally obviously the result of a long, skilled and hard-working life spent at prosperous mines using an employment system that gave their workers at least some share in their good fortune. In this context, and whatever the myriad other reasons for it, attention should also be drawn to the almost complete absence of organized labour and serious industrial strife in Cornish mining throughout the nineteenth century.³⁸ Notwithstanding its long industrial heritage, Cornwall still had almost the lowest number of trade union members in the country in 1892, assessed as a percentage of the total population of the county.³⁹

COMPARATIVE EARNINGS IN OTHER DOMESTIC OCCUPATIONS

While miners and their families may have seen their lives rocking between plenty and want, most agricultural labourers experienced only unremitting poverty. That occupation certainly provided no attractive alternative employment to mining, whatever its dangers and debilitating consequences. Indeed, the flow of occupational mobility was almost certainly in the other direction. Hunt has shown, for example, that in areas immediately adjacent to the tin and copper mining districts, agricultural wages could be up to fifty per cent higher than in the more remote rural districts.⁴⁰ Similarly, Rowe demonstrated that while agricultural wages in the expanding mining districts of north Cornwall increased significantly during the 1830s, (from 1s to 1s 4d per day), in areas where there was no local mining or fishing to compete for labour, they remained as low as 7s a

36. Price, *West Barbary*, pp. 161–162.

37. See A.K. Hamilton Jenkin, *Cornwall and Its People* (London, 1945), p. 218; Rowe, *Cornwall*, ch. 6 (i); Rowe, *Hard Rock*, pp. 165–166.

38. Burt, *Lead Mining*, p. 144.

39. Edward H. Hunt, *Regional Wage Variations in Britain, 1850–1914* (Oxford, 1973), p. 355.

40. *Ibid.*, p. 14.

week until the mid-century, showing no increase for two generations.⁴¹ Even in areas boosted by urban food demand, such as that around Truro, the average wage of agricultural labourers did not exceed 10s a week, although perquisites of subsidized housing, cheap grain, etc. might increase the net worth of these wages to more like 14s a week. In Hamilton Jenkin's view, even adult male surface workers at the mines – the most unskilled and poorly paid section of the workforce, with just 35s to 40s per month – generally did better than agricultural labourers. He concluded that, "The remuneration of farm labourers was even lower, averaging but 1s a day in most cases, though a skilled man might, with luck, earn 9s a week, with a cottage, or 12s without."⁴² By the late 1860s things seem to have improved a little, with agricultural wages in the mining areas of the west of the county having risen to 11s or 12s including perquisites, but some of the latter was paid in kind and its value deducted from money wages. Everywhere there were opportunities for exploitation, social control, and the diminution of individual freedom.⁴³ In his analysis of regional variation in wages, Hunt has concluded that farm workers in the south west of England in the mid-nineteenth century were among the most poorly paid in the country and that, with relatively high food costs, the food consumption of some groups compared unfavourably with work-house diets and that of slaves in the American South.⁴⁴

There are no published indices of agricultural labourers' wages in Cornwall, but yearly estimates of average earnings are available for neighbouring districts of Devon. Hunt has shown that there were no significant variations in wages between the two counties⁴⁵ and these estimates can be used as a good proxy for both absolute levels and directions of change during the period. In general terms, levels appear to have remained low and steady through to the 1850s and then to have increased slowly through to the late 1860s. The 1870s saw a sudden upsurge in incomes, reflecting increasing levels of emigration and movement away from the land, before settling on to a new, higher plateau in the 1880s.⁴⁶ Not only were farm workers paid less than underground miners, but their family members were also more poorly remunerated and were employed less regularly. Female field labour, for example, seems to have been paid between 6d and 8d a day for much of the second and third

41. Rowe, *Cornwall*, pp. 142, 238.

42. Jenkin, *Cornish Miner*, p. 332.

43. *Ibid.*, p. 343.

44. Hunt, *Wage Variation*, pp. 14–15, 82.

45. *Ibid.*, p. 14.

46. See Bryan Nicholls, "The Economic and Social Power of Two Landed Families in Nineteenth Century Rural Devon, with Particular Reference to their Provision of Labourers' Housing", 2 vols (M.Phil., University of Exeter, 1996), 1, p. 53.

quarters of the nineteenth century and children 3d to 4d a day. Under such conditions, total family incomes for agricultural workers were estimated at around 12s to 13s. per week,⁴⁷ or about half those received by the families of skilled miners. Hours of labour in agriculture were also significantly longer for many family members. Women and girls employed on the mine dressing floors might work the same twelve-hour-plus shifts in summer that were usual in agriculture, but adult male labour and older boys rarely worked longer than eight-hour shifts underground. Finally, it should be noticed that farm labourers did not enjoy the same sickness and accident benefits provided by the mines. Premiums to cover such eventualities were deducted from miners' pay, but their families did have the assurance of some minimum subsistence safety net if things did go wrong. Thus Leifchild noticed that at Fowey Consols mine in 1837, every miner had 1s 9d per month deducted from his earnings to ensure an income of 30s per month during illness, with medical attendance and medicine provided for himself and his family.⁴⁸

A direct comparison of the earnings of Cornish miners and agricultural labourers would suggest that those of the former were anywhere between thirty and fifty per cent higher than those of the latter for most of the second and third quarters of the nineteenth century. This would more than compensate – in direct financial terms – for the eighteen per cent reduced life expectancy associated with mining labour compared with “healthy” agricultural pursuits. Taking into account the higher incomes that could also be earned by other family members, and possibly greater continuity and regularity of employment, this would make mining a far more attractive occupation than the other major local alternative, and indicate a clear economic rationality in the choice of mining as a career for those who intended to remain in the county. Certainly all other available circumstantial evidence suggests that the principal occupational mobility within Cornwall was from agriculture towards mining.

Although Cornish miners may have been better off than other local labouring groups, there is little doubt that they remained poor in absolute terms, and during periods of depression in mining, when wages, hours and employment were cut back, they fell to, or even below, subsistence level. From an early date, they looked to geographical and/or occupational mobility to alleviate these problems, and evolved a veritable “emigration culture” or “culture of mobility” in the county.⁴⁹ Certainly the district saw one of the highest and most sustained levels of net outward migration of

47. *Ibid.*, p. 343.

48. Leifchild, *Mines and Miners*, p. 179.

49. Philip J. Payton, *The Making of Modern Cornwall* (Redruth, 1992), p. 112; Payton, *Cornish Overseas*, ch. 2.

any part of the United Kingdom during the nineteenth century.⁵⁰ To maximize the returns on their existing skills and experience, the most obvious direction of such movement would be to other forms of mining activity, at home or abroad.

Domestically, the main opportunities were likely to have been found in the rapidly expanding coal industry. Metal-mining districts in other parts of England and Wales could, and did, absorb migrant Cornish labour but the short- and long-term market influences affecting them were similar to those shaping the prosperity of the southwestern industry and these generally offered no significantly different prospects from those seen at home.⁵¹ Coal mining, on the other hand was expanding rapidly during the second half of the nineteenth century and its productive capacity was frequently held in check by a shortage of labour, producing sharp increases in wages.⁵² But did geographical and occupational movement to the coal fields make rational economic sense? Clearly it did for some, but their number was small. Deacon has demonstrated, for example, that the principal domestic destination for migrants from Cornwall during the latter half of the nineteenth century was neighbouring Devon and the London and home counties area. The coal mining and industrial counties of Glamorgan, Lancashire, Yorkshire and Durham came a distant third in importance, and many of the migrants moving to those districts might have found their principal employment outside mining – in textiles, for example, in Lancashire and Yorkshire. No clear figures exist, but it is likely that the number of Cornish-born workers directly employed in the coal and iron mining industries of South Wales and northern England amounted to considerably less than 2,000 in 1861. Severe depression in Cornwall in the later 1860s and 1870s undoubtedly sharply increased that number, but many then used their newfound prosperity to finance emigration to established overseas destinations. In 1891 it is probable that no more than 3–4,000 Cornish-born miners found employment in the British coal industry.⁵³

Unfortunately, it is almost impossible to compare probable lifetime earnings from metal and coal mining for most of the nineteenth century

50. See Hunt, *Wage Variation*, p. 247. Cornwall was the only county in England and Wales to produce more lifetime male emigrants than internal migrants. See Dudley Baines, *Migration in a Mature Economy: Emigration and Internal Migration in England and Wales* (Cambridge, 1985), p. 159.

51. Burt, *Lead Mining*, p. 195.

52. Roy Church with Alan Hall and John Kanefsky, *The History of the British Coal Industry*, vol. 3, 1830–1913: *Victorian Pre-Eminence* (Oxford, 1986), p. 755.

53. Bernard Deacon, “A Forgotten Migration Stream: The Cornish Movement to England and Wales in the Nineteenth Century”, in Philip Payton (ed.), *Cornish Studies*, 6 (Exeter, 1998), pp. 96–117.

because wages in both sectors were immensely variable. As in metal mining, wages for underground labour varied considerably between different types of work, between pitches, between mines, between districts, and over short periods of time, as the industries fluctuated between prosperity and depression. Both industries were plagued by periodic layoffs and short-time working; deductions for tools and materials, fines, and payments in kind. Echoing the comments made about the Cornish employment system above, Mitchell has concluded that for most of the nineteenth century the concept of a wage rate for coal mining is meaningless. He elaborated that, "The coal industry was one in which the industrious worker experienced a wide range in his earnings in the course of every few years, and in which even the less industrious experienced a range with only a few degrees less spread."⁵⁴ Also, as has been seen, the impact of underground labour in coal mines on miners health and longevity was highly variable between districts, making calculations of average working lifetime highly hazardous.⁵⁵

Nevertheless, there is some broadly indicative evidence to compare earnings levels in the two industries and their effect on domestic Cornish migration patterns. Mitchell and Benson have noticed, for example, that wages for coal hewers in the Somerset and Bristol coal fields – the most easily accessible for Cornish metal miners – were among the lowest in the country for that industry, averaging only around 3s 3d a day from the 1840s through to the 1880s.⁵⁶ This was roughly the equivalent of earnings in the copper and tin mines at the beginning of the period but slipped progressively behind as time passed. By the 1880s, therefore, that particular district would have offered few attractions for Cornish miners. This appears to be supported by the evidence of the overall pattern of domestic Cornish migration discussed by Deacon. He shows that in 1861, the number of Cornish-born male labourers recorded in Somerset was small, at less than two per cent of the total number resident outside of the county, but that it had fallen still further by 1891. In the coal and iron mines of the Forest of Dean, a little to the north of Somerset, the wages were slightly higher and the movement of Cornish labour a little more positive – though still small overall.⁵⁷ A very different picture emerges, however, for the coal mining districts of Glamorgan in South Wales. Whereas the Somerset and Forest of Dean coalfields were among the lowest-paid districts in the country, South Wales became one of the

54. B.R. Mitchell, *The Economic Development of the British Coal Industry 1800–1914* (Cambridge, 1984), pp. 192, 232. For a detailed discussion of the causes of wage variation in the coal industry, see Benson, *Coal Miners*, pp. 64–78.

55. See above, p. 53.

56. Mitchell, *Coal Industry*, p. 197; Benson, *Coal Miners*, p. 78.

57. Deacon, "Cornish Movement", pp. 100–108; Hunt, *Wage Variations*, pp. 16–17.

highest, with rates being driven up by the rapid expansion of the mines after the early 1870s. By the end of that decade, coal hewers received 4s 9d per shift, or well over the average £1 a week then received by tributers in southwestern metal mines.⁵⁸ While South Wales was a considerable distance from Cornwall by land, there were long-established and easy maritime links between the two regions, and the physical obstacles to movement were minimal. Taking this, together with the effects of labour shortages on the general level of wages across all of the industries of South Wales, it is not surprising that Glamorgan emerges as one of the favourite destinations for domestic Cornish migration, after Devon and the London area, during the last half of the nineteenth century.⁵⁹

Again, however, it is important to stress the close limits on the absolute size of that movement. In 1891, only 3,174 Cornish-born male labourers of all descriptions were reported to be resident in Glamorgan, or less than eight per cent of the total number of the sons of that county resident elsewhere in England and Wales.⁶⁰ This may partly have resulted from the considerable hostility they had experienced from the host coalmining communities – who often saw the Cornish initially introduced by the coal owners as strike-breakers⁶¹ – but it no doubt also had various financial and practical explanations. As far as metal miners were concerned, coal mining may have offered higher pay in the long term, but also posed important “transition costs” and a perceived increase in mortality from a higher accident rate and increased lung disease. While coal hewers, the best rewarded of underground labourers, may have received higher wages than metal miners, the pay for entry-level general underground labour in coal mines – at around 3s a shift – was much lower, and below the average returns for tribute and tut contracts in Cornwall. Also, the overall earnings levels for single males – those most likely to make migration decisions – were significantly lower than those available to married men, since single men were not offered the significant additional benefits of free housing and coal supplies.⁶² Perhaps most importantly, however, the nature of the labour was much different. While metal miners combined their physical labour with skill, experience and explosives to maximize their productivity from a continuously changing and variable resource, coal hewers had little alternative other than the continuous application of maximum physical effort to break and move a relatively homogeneous product. To the

58. Mitchell, *Coal Industry*, p. 243, and above, p. 60.

59. Deacon, “Cornish Movement”, p. 101.

60. *Ibid.*

61. In December 1867, Welsh colliers at the Cae Coed colliery in Glamorgan rioted and attacked Cornish miners brought in to defeat a strike some months earlier. See Barton, *Essays*, vol. 1, p. 50. See also Mitchell, *Coal Industry*, pp. 116, 120–121.

62. Benson, *Coal Miners*, p. 73.

Cornish, theirs was the skilled activity of mining; the getting of coal was rather the crude unskilled province of the collier, who was little more than an underground quarryman. The tributer had the increasing possibility of lucrative contracts concluded on the basis of his accumulated skill and experience; the coal hewer could only grow older and see his strength, productivity and earnings diminish.

Similarly, metal miners commonly regarded coal mining as an even more hazardous occupation than their own. The individual accident rate in Cornish mines may have been high, but there were very few mass disasters similar to those caused by poisonous and explosive gas in coal mines. As Leifchild observed,

The Cornish miner can go into his mine without any fear of being blown up, however much he might fear tumbling down [...]. He can sit at ease, and read or hear of explosions that have destroyed forty, or eighty, or a hundred and twenty souls in a few minutes. He has not lost a son by fire-damp, or a father by "after damp" [...] he has never yet been called upon to assist in excavating blasted bodies from exploded mines.⁶³

Such events were increasingly reported in the national and local press from the third quarter of the nineteenth century, and public figures, such as William Farr, produced figures to demonstrate that there were very real causes for concern. In his tables for the years 1849–1853, Farr showed that the death rate as a percentage of miners aged fifteen years and above, was less than 1.8 per cent in Cornish mines and over 2.6 per cent in South Wales. During the same period, the incidence of violent death in the collieries of South Wales was almost three times that of Cornish copper and tin mines.⁶⁴ Though this gap was narrowed in later years, by a rising death rate from all causes in Cornwall and improving conditions in South Wales, established reputations no doubt proved difficult to change. Overall, therefore, earnings from coal mining may have been significantly higher than those from copper and tin, particularly after the early 1870s, but short-term transition costs and perceived major reductions in life expectancy would have made choice between the two occupations a difficult one to judge. Some of those in Cornwall who were threatened with unemployment and deteriorating living standards felt themselves obliged to make a positive choice here and, like tens of thousands of other migrants from industrial towns and rural areas across England, opted for the higher incomes offered by coal, whatever its toll on mortality.⁶⁵ As we

63. Leifchild, *Mines and Miners*, pp. 283–284.

64. *Kinnaird Commission*, 24 (ii), p. 171.

65. Church *et al.*, *Coal Industry*, pp. 221–222.

shall see, however, far more found a preferable alternative in their own industry overseas.

COMPARATIVE EARNINGS IN METAL MINING OVERSEAS

Where the attractions of occupational mobility at home fell short, those of geographical mobility to developing foreign metal mines seem to have provided lasting fascination. The mid- and later nineteenth century saw the rapid expansion of metal mining districts throughout the Americas, Africa, and Australasia, and Cornish miners were in great demand everywhere. Although the adoption of the Cornish contract system in most of these districts makes direct comparisons of wages difficult, there is little doubt that earnings abroad were considerably greater than those available at home, even in the best paid coal mines or manufacturing occupations. The early migrants to the Michigan copper district were averaging earnings of \$30 (£6) per month in the 1840s and this had more than doubled by the 1860s. In the early gold diggings of California, miners could earn (dig for themselves) upwards of \$15 a day and, although this had fallen to \$5 a day by the early 1850s, successful workers could achieve in a matter of weeks what would require years of labour at home.⁶⁶ Living expenses and the temptations of drinking and gambling in the early mining camps reduced net and retained income but these were rarely issues that the young and optimistic took into account.⁶⁷ Certainly the careful and diligent could hope to accumulate surpluses rarely possible for manual labourers in England. Even after the high rolling years of the first stages of the gold rushes had passed, skilled metal miners' wages in most US, as well as Canadian, mining districts settled around \$3–\$4 a day for the last four decades of the nineteenth century,⁶⁸ or two or three times those probable in Cornwall. Living costs also fell dramatically as railroad connections reached even the remote mining districts and most miners' families would have enjoyed a standard of accommodation and consumption unavailable

66. W.B. Gates, *Michigan Copper and Boston Dollars: An Economic History of the Michigan Copper Mining Industry* (Cambridge, MA, 1951), p. 101; Rodman W. Paul, *Mining Frontiers of the Far West, 1848–1880* (Albuquerque, NM, 1963), p. 35.

67. See Elizabeth Jameson, *All That Glitters: Class, Conflict and Community in Cripple Creek* (Urbana, IL, 1998), ch. 1; Rowe, *Hard Rock*, pp. 166, 191–192.

68. George H. Hildebrand and Garth L. Mangum, *Capital and Labor in American Copper, 1845–1990* (Cambridge, MA, 1992), p. 120; Charles K. Hyde, *Copper for America: The United States Copper Industry from Colonial Times to the 1990s* (Tucson, AZ, 1998), pp. 48, 105; Ronald M. James, *The Roar and the Silence: A History of Virginia City and the Comstock Lode* (Reno, NV, 1998), pp. 140–141; Jeremy Mouat, *Roaring Days: Rossland's Mines and the History of British Columbia* (Vancouver, BC, 1995), p. 73; Dianne Newell, *Technology on the Frontier: Mining in Old Ontario* (Vancouver, BC, 1986), pp. 84–85.

at home.⁶⁹ In the 1870s and 1880s, for example, the rent for relatively large and good quality company housing in many American metal mining districts was around £1 per room per month, with a fresh water supply at just 50 cents.⁷⁰

The story was much the same in South America, South Africa, and Australia. At the British owned St. John d'el Rey Mining Company operating in the Minas Gerais district of Brazil, for example, Cornish miners received between £10 and £18 per month in the mid-1860s, or two to three times their domestic earnings level. By the 1880s some of the older and more experienced miners were making between £15 and £20 a month. As a further incentive, and also to help stabilize the labour force, the employers offered the opportunity for miners to receive part of their pay by direct payment into a bank account in England.⁷¹ Similarly, the British owned Real del Monte Company, working silver mines near Pachuca in Mexico, recruited Cornish miners on a guaranteed labour contract at 10s a day, plus travel and clothing expenses, as early as the 1820s, and transferred part of their earnings direct from London to their families at home.⁷² But the attractions were not simply financial – there was also the far greater possibility of career progression and further increments to income. As in North America, middle and senior management positions in metal mining operations were commonly filled by “apprenticeship trained” Cornish miners for most of the nineteenth century. As early as the 1830s, management grade company officials at the Real del Monte operations were receiving anywhere between \$150 and \$250 a month. Everywhere family and kinship networks created excellent opportunities for the skilled and talented to progress upwards (literally) through the various grades of underground supervisor and “captain”.⁷³

69. The general cost of living index in America fell from the mid-1860s through to the mid-1880s and then remained steady until the end of the century. In most mining districts that decline would have been even more visible and sustained. See Bureau of the Census, *Historical Statistics of the United States: Colonial Times to 1957* (Washington DC, 1960), p. 127. See also Duane Smith, *Rocky Mountain Mining Camps: The Urban Frontier* (Lincoln, NB, 1967); Harry C. Freeman, *A Brief History of Butte, Montana* (Chicago, IL, 1900); Lynn R. Bailey, *Bisbee, Queen of the Copper Camps* (Tucson, AZ, 1983).

70. Todd, *America*, pp. 94, 128. See also Arthur W. Thurner, *Strangers and Sojourners: A History of Michigan's Keweenaw Peninsula* (Detroit, MI, 1994), pp. 94, 164–165.

71. Marshall C. Eakin, *British Enterprise in Brazil: The St. John d'el Rey Mining Company and the Morro Velho Gold Mine, 1830–1960* (London, 1989), pp. 239–240.

72. Arthur C. Todd, *The Search for Silver: Cornish Miners in Mexico, 1824–1947* (Padstow, 1977), pp. 47–48, 53.

73. Robert W. Randall, *Real del Monte: A British Mining Venture in Mexico* (Austin, TX, 1972), pp. 130–131. See also Larry D. Lankton, *Cradle to Grave: Life, Work and Death at the Lake Superior Copper Mines* (Oxford, 1991), pp. 61–62; and Charles E. Harvey and Jon Press, “Overseas Investment and the Professional Advance of British Metal Mining Engineers, 1851–1914”, *Economic History Review*, 42 (1987), pp. 185–207.



Figure 2. Cornish miners migrated all over the world in the quest for financial gain. From the 1850s onwards, gold discoveries lured many to Bendigo, Australia. Ian Glanville's cartoon, situated on the Bendigo goldfields at St Just's Point, captures with typical Cornish humour the precarious effects of the miners' work and the need to provide for the realities of ill health. *Previously published in St Just's Point, Book 1 (1990) by Ian Glanville, 48 Benghazi Ave, Golden Square, Victoria, Australia.*

In South Africa in the 1870s, the movement from share-working to more heavily capitalized company operations in the diamond fields greatly increased the demand for labour and forced up wages. African workers were soon earning much more than miners back in Cornwall and the wages for white overseers quadrupled from £5 a month to £5 a week. A major new destination was found for further waves of emigrants escaping from the now terminal decline of large-scale mining in Cornwall.⁷⁴ Anyone acquainted with steam engineering and pumping – quite common among Cornish immigrants – could command over £300 a year in wages and earn up to £500 with overtime.⁷⁵ Following the opening of the Witwatersrand field in the mid-1880s, newly arrived white miners immediately took up

74. Graham B. Dickason, *Cornish Immigrants to South Africa: The Cousin Jack's Contribution to the Development of Mining and Commerce 1820–1920* (Cape Town, 1978), pp. 53–65.

75. Robert V. Turrell, *Capital and Labour on the Kimberley Diamond Fields, 1871–1890* (Cambridge, 1987), pp. 55, 87, 89; Richard D. Dawe, *Cornish Pioneers in South Africa* (St Austell, 1998), pp. 85–91.

supervisory roles, managing and training stope gangs of up to twenty-five black “hammer boys”.⁷⁶ Working in the deep, dry, dusty and frequently infected conditions took an even greater toll on their health. By the early twentieth century, miners’ lung disease accounted for more than forty per cent of the deaths of all white males over the age of twenty, making it the most dangerous hard rock district in the world. To reward the acceptance of such dangers, it is not surprising that those miners also demanded, and received, the highest wages.⁷⁷

In Australia, many of the major mining developments were relatively close to good farming land and communications; costs were accordingly relatively low, and wages proportionately reduced.⁷⁸ Thus, in the late 1840s it was reported in Cornwall that “victuals were cheap” in the South Australia mining districts but that miners were earning anywhere between £2 and £3 a week – three or four times their level at home at that time.⁷⁹ After the rich pickings of the early years of their exploitation, wage levels there fell to levels probably lower than those in the Americas but still considerably above those at home. In the 1860s, for example, weekly earnings for miners in the Bendigo district of Victoria were around 45s, rising to 47s 6d in the early 1870s. This was below what could have been earned by miners on the Comstock, for example, but still twice the level then common in Cornwall. Thereafter, miners’ wages in Bendigo seem to have settled around 45s–50s a week and to have stayed fairly steady at that level until the end of the century. Before the 1879 strike, for example, weekly wages at the Lansell 222 mine appear to have fluctuated around £2 2s and the miners received maintenance payments of around half that during the strike itself – a subsistence payment at least equal to working wages back in Cornwall at that time.⁸⁰ In the Otago gold mining district of New Zealand, wages appear to have been slightly higher, averaging around £3 per week in the 1880s.⁸¹

76. Katz, *White Death*, pp. 51–53; Gillian Burke, “Disease, Labour Migration and Technological Change: The Case of the Cornish Miners”, in P. Weindling (ed.), *The Social History of Occupational Health* (London, 1985), pp. 78–88.

77. Gillian Burke and Peter Richardson, “The Profits of Death: A Comparative Study of Miners’ Phthisis in Cornwall and the Transvaal, 1876–1918”, *Journal of South African Studies*, 4 (1978), pp. 147–171, 164.

78. Geoffrey Blainey, *The Tyranny of Distance* (Melbourne, VIC, 1966), pp. 145–146.

79. Philip J. Payton, *The Cornish Miner in Australia* (Redruth, 1984), p. 18; Barton, *Essays*, vol. 1, p. 82. See also Patricia Lay, *One and All: The Cornish in New South Wales* (Queanbeyan, NSW, 1998).

80. La Trobe University Library Archives (Melbourne, VIC), *Pope Diaries*, ms. no. 11918. See entries for October 1879. See also John C. Fahey, “Wealth and Social Mobility in Bendigo and North Central Victoria, 1879–1901” (Ph.D., University of Melbourne, VIC, 1981), p. 129.

81. Elaine E. Bolitho, *Reefton School of Mines* (Reefton, NZ, 1999), p. 34.

CONCLUSION

In all of this discussion, there has been an assumption that miners could and did make a simple choice of their long-term occupation. Space has prohibited a careful examination of the labour market in which they operated, the very different and evolving forces that shaped their decisions, and the changing opportunities for alternative employment. Thus the buoyant and optimistic conditions of the 1840s and 1850s, when real metal prices were increasing and employment was expanding, were far from the depression years of the 1860s and 1870s, when prices collapsed and the industry contracted sharply. Microregions within the county saw significant differences in employment opportunities depending on mineralization, urbanization, access to the sea, and a host of other factors. Similarly, the realities of choice were often unavailable. Sudden variations in earnings and employment could increase the pressures for occupational and/or geographical mobility but reduce the capacity to undertake it; alternative long-term employment in local agriculture was rarely a real alternative in such a crowded county. Instead, the focus here has been on broader, long-term forces that shaped the decisions of successive generations of workers to remain loyal to an industry that took an inordinate toll on their lives. In writing about black migrants to the gold mines of the Rand, and the enormous risks of accident and damage to health that those workers accepted, Crush *et al.* postulated that, "The migrants were not rushing blindly to selfdestruction like lemmings but were in most cases making a rational decision in a situation of unattractive alternatives."⁸² Much the same could be said of those Cornishmen, and their families, who chose a life of labour in metal mining, and often followed their calling across the world. Their domestic system of employment – in which they became effectively fellow "adventurers" along with those who financed the mines – often plunged them into short-term poverty but in the longer term produced wage levels that placed them among the relatively well-paid sections of the British working class.⁸³ Those earnings levels, and other opportunities for generating additional family income, were certainly considerably greater than those available in agriculture and other labouring occupations within the southwest, which remained one of the lowest wage areas in the United Kingdom.

From insurance company estimates of the precise life-shortening effects of underground labour, and comparison of miners' wages with other local

82. Jonathan Crush, Alan Jeeves and David Yudelman, *South Africa's Labour Empire: A History of Black Migrancy to the Gold Mines* (Cape Town, 1991), p. 3.

83. John Rule, "A Risky Business: Death, Injury, and Religion in Cornish Mining, c. 1780–1870", in A. Bernard Knapp, Vincent C. Pigott and Eugenia W. Herbert (eds), *Social Approaches to an Industrial Past* (London, 1998), ch. 10, p. 172.

groups, there is little doubt that the miners were substantially compensated for the deleterious affects of their occupation – total potential earnings over a shortened lifetime exceeding those of the longer-lived “healthy” population. If miners chose to be geographically mobile – selling their semiskills in an international market rather than domestically – the financial advantages of their choice of trade were increased exponentially. Very few other labouring groups in Britain could have matched the wages paid to metal miners in the world’s new and developing mining districts, and fewer still offered the same opportunities for career advancement into junior and senior management. Clearly large numbers of “surplus” miners were expelled from the Cornish mining sector during great spasms of contraction during the mid- and late nineteenth century, but the fact that they demonstrated such occupational loyalty – moving to similar jobs abroad rather than to different industries elsewhere in Britain – attests their awareness of the international transactability of their skills. Their position was both similar to, and different from, that of their Celtic cousins in Ireland.⁸⁴ The latter were also forced out, but never offered the same attractive rewards abroad as those commanded by the Cornish. It is not surprising that, in their final emigration destination, the Cornish usually conspired to maintain their elevated market position by steadfastly defending their separateness from their ethnic kin.⁸⁵ To put it another way, overseas emigration for the Cornish was not the only solution to unemployment at home,⁸⁶ but an unusual and rationally chosen one, over and above internal, domestic geographical and occupational mobility, which is the usual recourse for those trapped in restructuring regional economies. In this respect, the Cornish were not the unusual group that they have often been presented as in the general literature of British nineteenth-century emigration.⁸⁷ Young adults may have shown a greater propensity to leave that county than any other in England and Wales, but the motivating influences were much the same as any other district. Gottlieb’s study of the emigration of British coal miners to America in the 1860s and 1870s, for example, displays very similar decision-making processes, as does Vugt’s more recent work on the migration behaviour of British textile and iron workers, though in that latter case, the expansion of

84. See Christine Kinealy, *This Great Calamity: The Irish Famine 1845–52* (Boulder, CO, 1995), p. 344.

85. James, *Comstock*, p. 147; Ronald M. James, “Defining the Group: Nineteenth Century Cornish on the Mining Frontier”, in Philip Payton (ed.), *Cornish Studies*, 2 (Exeter, 1994); David M. Emmons, *The Butte Irish: Class and Ethnicity in an American Mining Town, 1875–1925* (Urbana, IL, 1990), p. 239.

86. See, for example, Todd, *America*, p. 19; Gillian Burke, “The Cornish Diaspora of the Nineteenth Century”, in Sheila Marks and Peter Richardson (eds), *International Labour Migration: Historical Perspectives* (London, 1984), pp. 57–75.

87. See Baines, *Migration*, p. 159.

the industry at home overcame the competing attractions of higher wages in the U.S.⁸⁸ There is no significant evidence for “Cornish exceptionalism” – they behaved much like any other group of rational “economic migrants”. Of course, sociocultural factors also played an important part in holding those communities together across space and time. “Exchanging the land of bondage for the land of the free”, simply moving to the “next parish after Land’s End”, embracing political and social attitudes much publicized in the local press that made the Cornish “almost American before their ship left Falmouth”⁸⁹ – were all powerful interacting forces that focused emigration decisions and directions. But the influence of “economic man” clearly shines through, knowingly embracing, not just the risks, but the inevitability of the life-shortening consequences of their occupation, in exchange for higher – often much higher – financial returns in the short run. The Cornish miner of the mid-nineteenth century – like those before and after him – sold part of his life for higher wages and, in terms of what he might otherwise have done, made a profit on it.

88. Amy Zahl Gottlieb, “Immigration of British Coal Miners in the Civil War Decade”, *International Review of Social History*, 23 (1978), pp. 357–375; William E. van Vugt, “Prosperity and Industrial Emigration from Britain During the Early 1850s”, *Journal of Social History*, 22 (1988), pp. 339–354 and *idem*, *Britain to America* (Urbana, IL, 1999).

89. Rowe, *Hard Rock*, ch. 2.