

# The shares of wages, profit, and rent in New Zealand: two decompositions

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## Abstract

There is general agreement that the labour share of New Zealand's national income has been falling in recent decades. There is less agreement about the reasons for this decline, its implications for policy, and who exactly has benefited. Two recent advances in the overseas literature highlight the dangers of relying on over-aggregated data to describe the allocation of the social product between two claimants, "labour" and "capital". Bichler and Nitzan's (2020) procedure for decomposing the wage share between compensation per employee relative to national income per adult and changes in the size of the employee workforce relative to the total adult population shows how changes in the wage share may fail to identify changes in the real product wage rate as a share of output. And Barkai's (2020) decomposition of operating surplus aims to identify the share of economic rent, as distinct from genuine profit, in that national-accounts measure. Our paper applies these insights to the New Zealand data to track changes in the distribution of the social product over the past eighty years.

\* We acknowledge with gratitude the assistance of Dr Martin Lally in our research for section 3 of this paper. All errors, and conclusions drawn, are entirely our responsibility.

This paper reports on work in progress, and presents provisional results which are subject to revision as our calculations and data are refined and improved. Please check with the authors before using or quoting any of these results. We welcome comments, criticisms and suggestions.

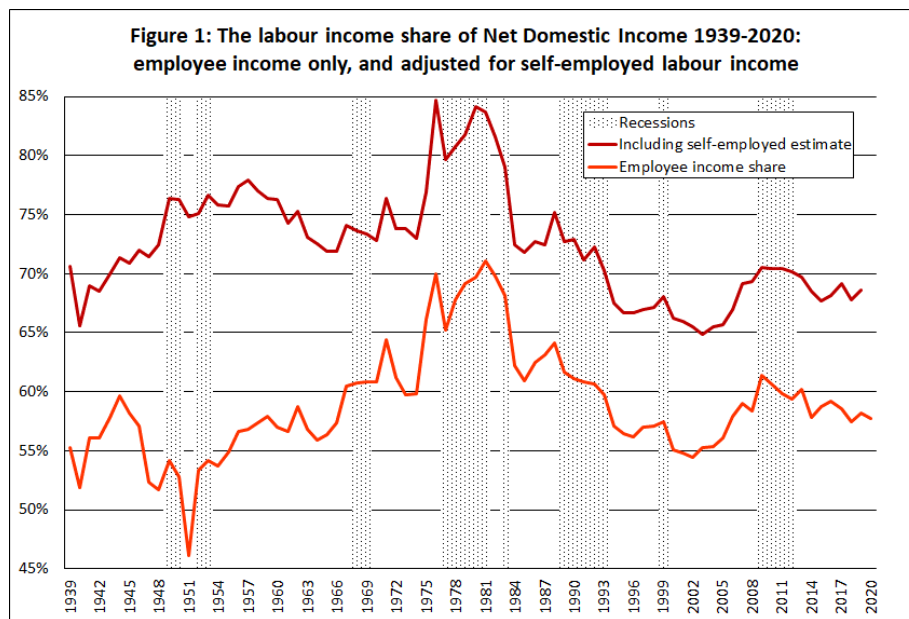
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## 1. Introduction

Widening income and wealth inequality has been a conspicuous feature of Western advanced economies over recent decades (Piketty 2014) and has sparked a rapidly growing literature. One branch of that literature has focused on the falling share of wages in total factor payments (Autor *et al* 2017, 2020; De Loecker *et al* 2020; Elsby *et al* 2013; Karabarbounis and Neiman 2014; Stansbury and Summers 2020; Taylor and Omer 2020) and this has been the subject of several New Zealand studies (Bertram 2000; Rosenberg 2017; Conway *et al* 2017). The picture that has emerged is captured in Figure 1, which is taken from Rosenberg's (2017 p.82) Figure 2, updated to 2020.



Two questions arising from this picture of a falling labour share since 1980 are first, why does the Employment Contracts Act 1991 (ECA) produce no obvious break in the trend; and second, where did the redistributed product go (who, in other words, was the beneficiary)?

Regarding the first question, Bertram (2000 p.11) commented with surprise that “the Employment Contracts Act looks to have been simply a symptom of the general trend, not a significant event in its own right.” Yet Hall and Scobie (2005 p.17 Figure 13 and p.20 Figure 17) subsequently presented evidence of a sharp upward step in the return to capital and a downward step in the real wage in 1992 and 1993, the two years following the ECA, while qualitative descriptions of the impact of the ECA such as Macfie (2021) portray it as a decisive anti-labour turning point in labour relations. We find in this paper that the apparent smoothness of the downward trend 1980-2002 in Figure 1 is deceptive. Once the aggregated “wage share” statistic is broken down into two separate components - changes in the real product wage, and changes in the number of wage-earners - the ECA turns out to have been a decisive turning point, just as the qualitative record suggests. Our findings are thus supportive of the case for the pending legislation to set up Fair Pay Agreements.

Regarding the second question, one might have expected that a redistribution from wages to profits (operating surplus) would flow through to a significant increase in capital formation, capital stock, and consequent higher labour productivity, none of which have occurred. New Zealand remains capital-shallow (Dupuy *et al* 2008; Productivity Commission 2021). So where did the income share foregone by labour go? A growing body of overseas research (for example Barkai 2020; Hall 2018; Christophers 2021) has found evidence of a sharply increased share of economic rents, as distinct from competitive returns to capital, in those economies' operating surplus. If a similar trend can be identified in New Zealand, it would both help to explain the recent increase in inequality of wealth in New Zealand (Rashbrooke 2018; Rashbrooke *et al* 2021), and add weight to the argument that markups and the exercise of market power have been increasing since deregulation of local markets in the 1980s and 1990s (Bertram 2020, 2021).

In section 2 of this paper we disaggregate the crude wage-share measure that has been almost universally used in the literature to date, both in New Zealand and overseas, to show the negative impact of the ECA on the product-wage share once we control for changing numbers of employees, self-employed, and others within the adult population.

In section 3 we undertake a preliminary attempt at disaggregation of net operating surplus between normal profits (the cost of capital) and economic rents as a residual, looking for evidence of a rising share of rent (pure profit) since the mid-1980s. Section 4 summarises our conclusions.

In the analysis that follows, we are concerned with the before-tax distribution among competing claimants of the net factor product of the New Zealand economy. We are thus looking at the "predistribution" of the product (Piketty *et al* 2018; Bozio *et al* 2021), after allowance has been made for consumption of fixed capital but before direct taxes and transfers, and with indirect taxes and subsidies excluded from the measure of total product. Our data run from 1939 to 2019, a period of 81 years.

## **2. Labour's share and the Employment Contracts Act 1991**

A common practice among economists working on distribution has been to take the aggregate "compensation of employees", as shown in the national accounts, and divide it by some measure of national income, to show the "share" of "labour" in the economy's total marketed output. This approach has been underpinned by the neoclassical notion of an aggregate production function in which "labour" as a factor of production is treated as identical with total population, and the aggregate rewards of "labour" and "capital" are determined by their marginal products in a competitive economy at full employment (Solow 1956). The production-function-based explanation of factor shares was strongly buttressed by the celebrated "stylised facts" in Kaldor (1957), the first of which was that (1957 p.591) "the share of wages and the share of profits in the national income has shown a remarkable

constancy in ‘developed’ capitalist economies”. But the past half-century has seen this supposed “fact” (along with several of the others) empirically overturned as Kaldor’s supposedly constant ratio has swung steadily against labour, implicitly in favour of capital or rentiers (receivers of pure profits) (Eggertsson et al 2018). Neoclassical growth economists have sought to explain the empirical evidence via theories of “endogenous growth” (Mankiw, Romer and Weil 1992; Aghion and Howitt 1998) which rely heavily on unobservable hypothesised factors of production such as unmeasured intangible capital, the gains from which for some (seldom explained) reason accrue to non-labour-force recipients. Alternative explanations revolve around the elasticity of substitution between labour and capital: in the standard class of production functions, a value greater than 1 leads to a falling labour income share when the capital/labour ratio rises, and an elasticity between 0 and 1 leads to a rising labour share. Yet estimates of the elasticity are inexact and frequently find it to be one or less despite falling labour income shares (e.g in New Zealand Tipper 2012 and in the US Chirinko and Mallick, 2017).

The older Classical tradition in economics, along with modern institutional growth theorists (Acemoglu 2009 Part VIII), views the distribution of the total product, and in particular of the economic surplus, as a contest among broad classes (workers, capitalists and landowners/rentiers) in which each group acts strategically within constraints posed by, for example, resource scarcity, subsistence needs, and pre-existing technology. The two approaches confronted one another in the “Cambridge controversies” of the 1960s (Harcourt 1967; Cohen and Harcourt 2003 pp.210-212), in which both sides focused on broad aggregate shares of the product. But as one observer of the debate noted at the time (Blaug 1978 p.511, emphasis added),

[T]he great mystery of the modern theory of distribution is why anyone regards the *share* of wages and profits in total income as an interesting problem. It has, after all, little practical relevance. The standard of living of workers is reflected in the real wage rate and **the relative position of workers is better measured by the ratio of the real product wage per worker to the average income per head of the population than by labour’s relative share.**

In a recent paper Bichler and Nitzan (2020) have shown how that ratio of the product wage to average income per head, which we shall call the “product-wage ratio”, can be derived from the national accounts aggregates. Their decomposition of aggregate “compensation of employees” runs as follows:

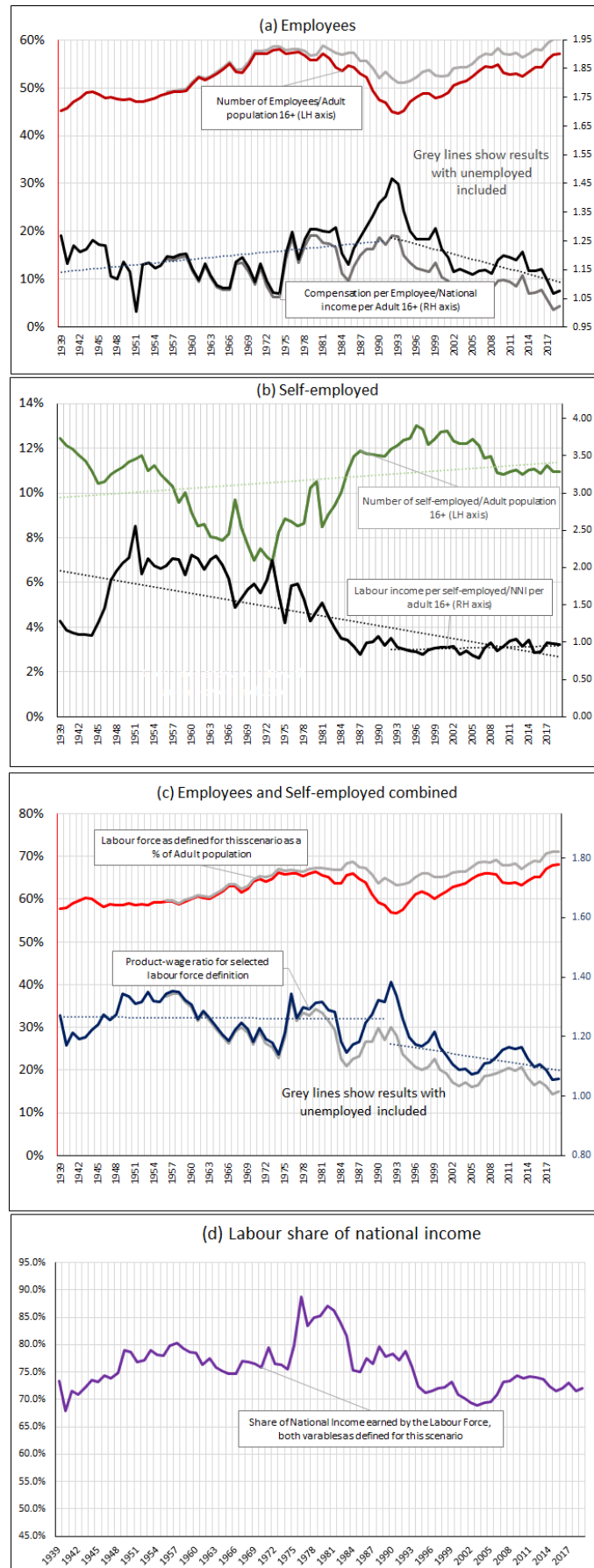
$$\begin{aligned}
\frac{\text{compensation of employees}}{\text{national income}} &= \frac{\text{compensation of employees}}{\text{number of employees}} \times \frac{\text{number of employees}}{\text{adult population}} \\
&\times \frac{\text{adult population}}{\text{national income}} \\
&= \frac{\text{number of employees}}{\text{adult population}} \times \frac{\frac{\text{compensation of employees}}{\text{number of employees}}}{\frac{\text{national income}}{\text{adult population}}} \\
&= \frac{\text{number of employees}}{\text{adult population}} \times \frac{\text{compensation per employee}}{\text{national income per adult}}
\end{aligned}$$

The second term in this final expression is what we call the product-wage ratio, corresponding to Blaug’s “relative position of workers”, with changes in the labour participation rate controlled for by the first term. The number of “employees” in the adult population is a matter of labour-market structure, driven by a variety of forces, while the product-wage ratio is a direct measure of the success or otherwise of employed labour in capturing a share in what it produces.

Figure 2, drawn using the data in Table 1 at the back of the paper, presents the results of our application of the Bichler-Nitzan decomposition. The dotted lines show our reading of the long-run trends at work. Panel (a) traces the picture for “Employees” (wage and salary earners). Panel (b) shows the self-employed. Panel (c) combines the two. The break in trend at 1992 is apparent in Panels (a) and (c), while Panel (b) reveals the radically changing position of the self-employed during the 1980s as the long-term decline in their relative numbers (becoming employees, or shareholders in their corporatised firms) was reversed. Our estimate of self-employed labour earnings relative to national per-adult income fell dramatically – a reflection of the change from the era when farmers and well remunerated professionals and managers were a dominant part of the self-employed to one where contractors and sub-contractors on insecure terms of employment became more important.

For Employees, Panel (a) of Figure 2 shows a gradual upward trend in their relative position during the postwar era. Their numbers were likely boosted by those leaving self-employment and by the large-scale movement of Māori from rural areas to (largely) wage employment in urban areas. This upward trend was abruptly broken in the second half of the 1980s by massive job losses occurring alongside a shortlived spike in the product-wage ratio (reflecting widespread attempts to restore wages lost in the Muldoon wage freeze between 1982 and 1984, and, we suspect, a tendency for job losses to hit hardest among the lower-paid). The ECA then marked a decisive downturn in the trend of the product-wage ratio, which declined steadily from 1992 through to the end of our data in 2019, while the Employee participation rate returned to its level of the early 1970s. Though the increased participation rate included increased proportions of part-timers, and particularly women at gender-biased lower rates of pay, ratios based on hourly earnings show a very similar trend.

**Figure 2: Components of the labour share**



The ratio of wage and salary average income to national per-adult income ran at around 1.3 from the mid 1970s to the early 1990s. The ECA's impact from 1992 was immediate and dramatic: the ratio of the product wage to income per adult fell to just 1.07 by 2019.

Comparing Figure 2 with Figure 1, it is clear that the apparently steady decline in the aggregate wage share between 1980 and 2002 shown in Figure 1 was an amalgam of three quite distinct periods in each of which a distinctive set of trends was at work. First, in the early 1980s there was a short-lived but dramatic squeeze on the product-wage share in the period of the Muldoon wage-price freeze. Then the recovery of the product-wage share was swamped by the onset of mass unemployment in the second half of the 1980s. Then after 1991, the recovery of labour participation took place in a context of a relentlessly falling product-wage ratio – a trend that continued thereafter. A flattening from 2002 and then a rise to 2009 coincided with a strengthening of some provisions of the Employment Relations Act which replaced the ECA in 2000, strong rises in the minimum wage, and falling unemployment until ended by a local recession and the Global Financial Crisis. The recessionary conditions began in 2008 and reduced returns to capital while wage rises took a year or so longer to slow. As in the late 1980s, the rapid rise in unemployment during the GFC is likely to have affected low-paid workers, initially helping to push up the per-worker wage rate.

Panel (c), combining Employees with Self-employed, strengthens the story of a generally solid product-wage ratio around 1.3 from the Second World War through to the 1980s, falling to 1.06 over the three decades following the ECA.

These findings look clearcut, but obviously are only as good as the data and assumptions that lie behind Figure 2. Take first the data. The source notes below Table 1 explain how we constructed our data set from successive sets of national accounts – the “Old National Accounts” for years before 1962, the original, discontinued, System of National Accounts series between 1962 and 1971 (the “old SNA”), and the current System of National Accounts (“SNEA”) since then. To obtain consistent series, in several cases we have used trends from the ONA accounts, and the old SNA accounts from 1962 to 1971, to back-cast series from the SNEA, thus chain-linking the three sets of accounts. Generally speaking we believe that this is the best that can realistically be achieved, and that different ways of reconciling old and new series would be unlikely to change the broad picture.

Strong assumptions, nevertheless, have had to be made to construct the series arrayed in Table 1 and plotted in Figure 2. The most important relate to the self-employed and the unemployed.

- First, we have included the self-employed in our total employed labour force and in the labour share shown in Panel (c).

- Second, we have imputed labour income to the self-employed by assuming that their total income – called “mixed income” in the national accounts, where it is included in operating surplus<sup>3</sup> – can be broken down between labour income and capital income by calculating labour income as being in the same ratio to total self-employed income as the economy-wide ratio of “compensation of employees” to Net Domestic Income (with the latter excluding mixed income and owner-occupied housing rent).
- Third, in the main results in Figure 2 we have excluded the unemployed from our labour force measure. An alternative is to include them as employees earning a zero wage<sup>4</sup>, which reduces our product-wage ratio, especially in periods of high unemployment. The importance of this assumption is readily apparent when we include the unemployed along with the employed wage and salary workforce – see the grey lines in Figure 2, where the conspicuous “spike” of the product-wage ratio about 1990 is suppressed, leaving the remainder of the picture effectively unchanged.

Detailed sensitivity testing exploring alternative assumptions shows that, across a wide range of alternative possible assumptions regarding our treatment of the self-employed and unemployed, our main conclusion appears robust.

Figure 3 presents our results from decomposing the labour share in a slightly different format, to clarify the evolving picture of interaction of the two components (labour participation rate and product-wage ratio). Over the half-century to 1974 the rising labour share appears to have been due entirely to a rising share of employees in employment, at an average wage rate that represented a steady claim on the per-worker total output.

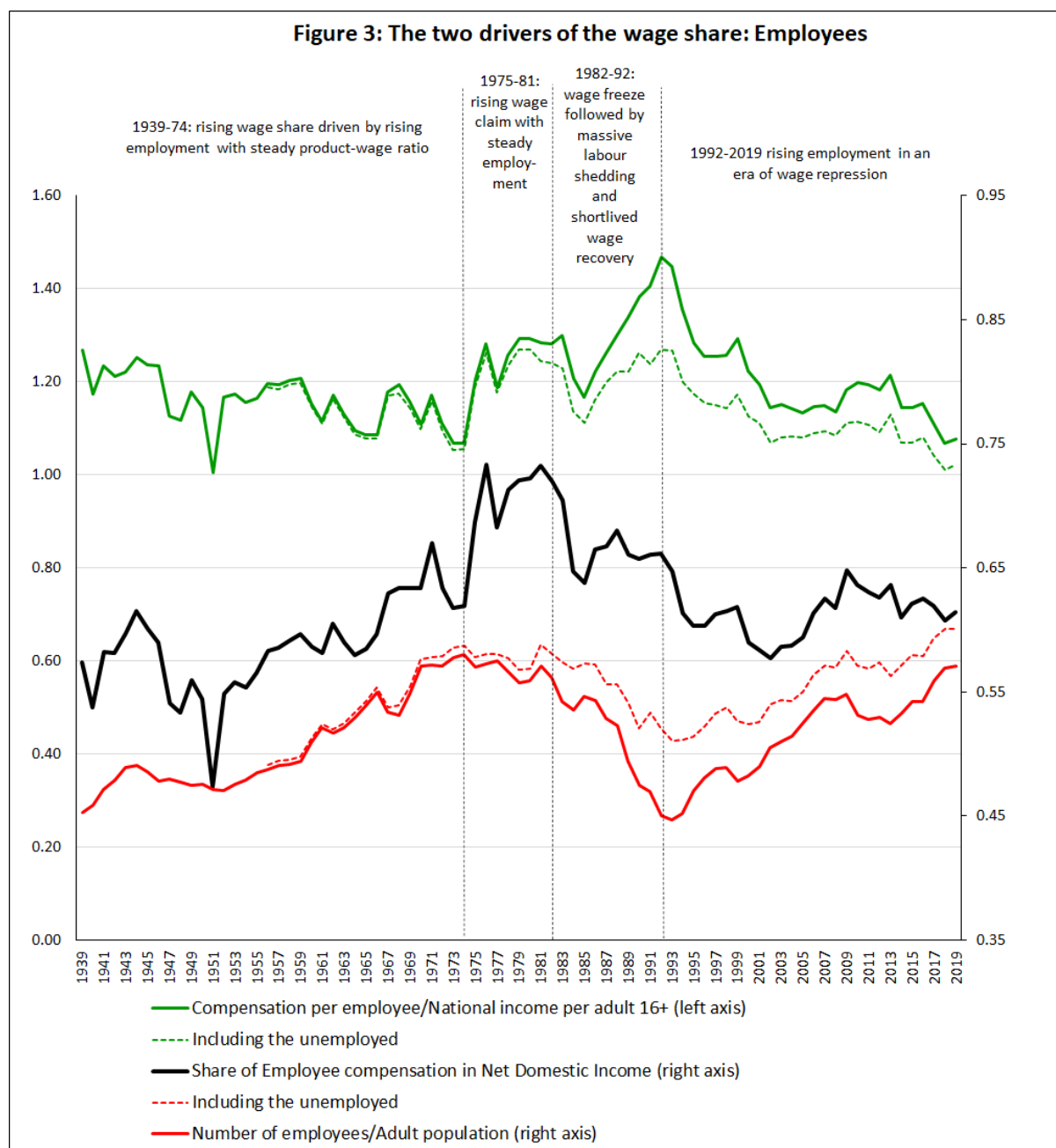
Then in the second half of the 1970s amid very high price inflation comes a wage push at the expense of the surplus, while employment slackened, corresponding to the stagflation phenomenon.

Mass unemployment (or more strictly, a fall in the fraction of the adult population employed for wages and salaries) then emerged during the 1980s starting with a wage freeze from 1982-84 and followed by dramatic and widespread restructuring of the economy and government. These dragged the labour share down again even as the relative wage claim of those who remained employed rose in another wage push attempting to recover ground lost in the wage freeze.

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<sup>3</sup> However we have used a very similar series, entrepreneurial income, to represent net mixed income, because a continuous series can be constructed for the whole period. See the notes to Table 1 and Rosenberg 2017b.

<sup>4</sup> Data obtained by special request from Statistics New Zealand shows that between 1986 and 2016, 94% of unemployed people who provided their previous employment status had been wage and salary earners, and an average of 97% from 2017 to 2020 though with a change in survey methodology. Over the same period, an average of 81% of people in employment were wage and salary earners. As a simplification we have therefore placed all the unemployed among employees.



The historically low employment rate of 1992-3 coincided with the ECA which broke the position of the employed, at the same time as benefit cuts forced the unemployed back into the employed (but low-wage) workforce in any job they could get. Hence the story from 1993 was one of wage repression combined with a rising participation rate of the adult population in paid employment. This latter trend would have comprised several components: multiple members of low-income families seeking low-paid work simply to make ends meet; substantial numbers of self-employed moving back into employment; and some job creation at higher wages due to resumption of economic growth after the rogeronomics-induced recession. The rise in the wage share of income from 2002 to 2009 coincided as noted above with a strengthening of some provisions of the Employment Relations Act which replaced the

ECA in 2000, strong rises in the minimum wage, and falling unemployment until it was ended by a local recession and the Global Financial Crisis. The downward trend in both the labour income share and the product-wage ratio then resumed.

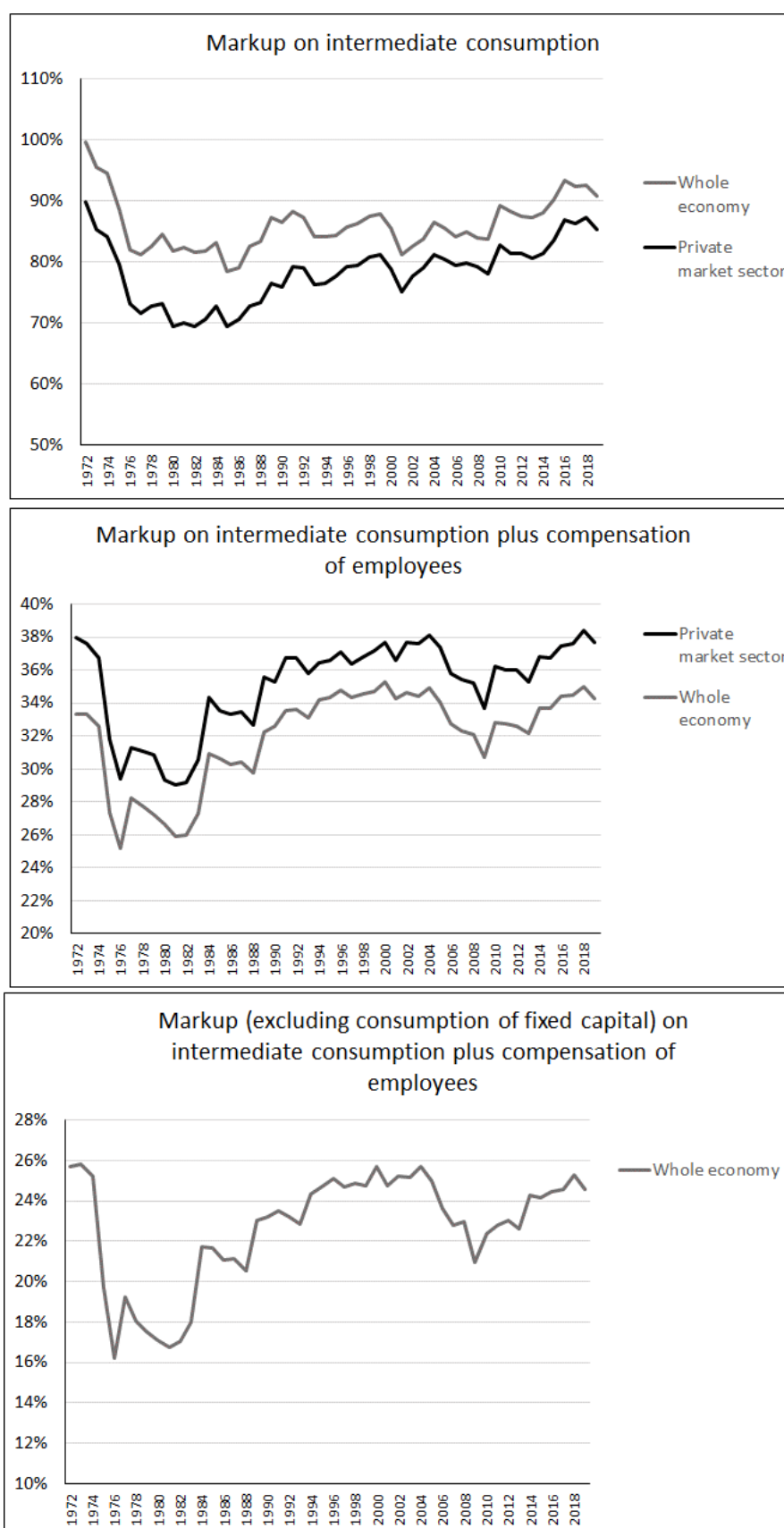
This breakdown of the history emphasises the two-stage negative impact on the labour share of policies in the late 1980s and early 1990s: first, the weakening of organised labour by mass unemployment, reducing the “working class” proportion of the adult population; then the hammer blow to the employed wage-earners’ real product wages from labour market deregulation in 1992 and subsequently.

### **3. A rising rent share?**

We turn now to analysis of the national-accounts category “gross domestic operating surplus”, which comprises a mix of depreciation allowances, self-employed income (“mixed income”), imputed rents on owner-occupied housing, normal profits on past investment in capital equipment and intangible assets, land rents, and “pure profits” (market-power rents); and includes flows of income accruing to overseas owners of assets located in New Zealand as well as to local recipients.

A feature of the recent overseas literature on income distribution has been identification of a rise in markups or margins, potentially reflective of an increase in market power, since the 1980s (e.g. Hall 2018, Basu 2019, De Loecker et al 2020). A preliminary review of the national-accounts data for the period since 1972 suggests that a similar increase in markups has been happening in New Zealand since the mid 1970s; see Figure 4, drawn from Table 2 at the end of the paper (although the dramatic fall in markups 1974-76 obviously raises the question of what went before).

**Figure 4: Markup trends 1972-2019**



The question addressed here, however, goes slightly deeper: how much of the economy's operating surplus, derived from markups over cost, is identifiable as a "required" or "warranted" return on investment in the economy's capital stock, leaving a residual which we can interpret as rent ("pure profit" in Barkai 2020).

Our approach follows that of Barkai (2020), who found what he argued to be clear evidence of a substantial increase in the pure-profit share of national income in the United States since 1980. Barkai's paper tested the hypothesis that the declining wage share was simply the mirror image of a rise in the share of productive capital. He found, on the contrary, that between 1984 and 2014, as the wage share fell 11%, the capital share (understood as the cost of capital times the net capital stock) fell even more, by 22% (Barkai 2020 p.2438 Table 1). He concluded that (2020 p.2423) "since the early 1980s firms have reduced both labor and capital costs and increased pure profit. In the main specification, the pure profit share (equal to the ratio of pure profits to gross value added) increases by 13.5 percentage points. To offer a sense of the magnitude, the value of this increase in pure profits amounts to .... \$14.6 thousand for each of the approximately 81 million employees of the nonfinancial corporate sector".

Barkai estimated the required gross return on capital in each year by multiplying the value of the capital stock by a cost of capital (that is, a required rate of return to cover the pre-tax rate of return required on investment for the average firm). He then estimated pure profits as "gross value added less the sum of compensation of employees, capital costs, and indirect taxes" (Barkai 2020 p.2424).

In the following we exclude the imputed return on owner-occupied housing because it has no labour content and is not under the control of the owner. Consequently we also exclude the corresponding assets.

His general formula for the required or warranted capital share of total value added is (Barkai 2020 p.2426 equation (5), following Hall and Jorgenson 1967):

$$S^K = \frac{\sum_s R_s P_s^K K_s}{P^Y Y}$$

where

$S^K$  is the required capital share (in dollars) of gross nominal value added (GDP minus the imputed return on owner-occupied housing)

$R_s$  is the required rate of return on capital of type  $s$ , comprising the weighted average cost of capital, plus the depreciation rate, minus expected price inflation of capital goods of type  $s$ , all adjusted for depreciation-related corporate tax deductions.

$P_s^K$  is the price of capital of type  $s$

$K_s$  is the stock of capital of type  $s$

$P^Y Y$  is the nominal value of gross value added

Pure profit is then (Barkai 2020 p.2426 equation (6))

$$\Pi = P^Y Y - wL - RP^K K - \text{indirect taxes}$$

To replicate Barkai's analysis for New Zealand we calculate the total surplus ( $P^Y Y - wL - \text{indirect taxes}$ ), subtract an estimate of  $RP^K K$  to obtain a "rent" residual in dollar terms, and then express the resulting estimates of required return and rent as shares of net national income alongside the labour share.

For this preliminary investigation we have treated the market sector of the economy as a single firm which invests in two types of fixed capital<sup>5</sup> with the expectation of recovering, over the life of the investment, at least sufficient revenue to cover operating costs (wages and intermediate purchases) plus the cost of capital at the economy-wide rate. The crucial cost of capital,  $RP^K K$ , is calculated as the product of the current-priced value of net capital stock and the required rate of return  $R$  which in turn is calculated as Barkai p.2425 equation 2)

$$R = \left[ \left( \frac{D}{D+E} i^D (1 - \tau) + \frac{E}{D+E} i^E \right) - \mathbb{E}[\pi] + \delta \right] \frac{1 - z\tau}{1 - \tau}$$

where

$\frac{D}{D+E}$  is the leverage ratio (debt to total debt plus equity)

$i^D$  is the debt cost of capital

$i^E$  is the equity cost of capital

$\tau$  is the corporate tax rate

$\mathbb{E}[\pi]$  is the expected inflation rate of capital goods, set equal to the actual rate in each year

$\delta$  is the depreciation rate

$z$  is the net present value of depreciation tax allowances

The aggregated firm's required or warranted gross rate of return thus comprises the Weighted Average Cost of Capital  $\left( \frac{D}{D+E} i^D (1 - \tau) + \frac{E}{D+E} i^E \right)$  plus the depreciation rate, minus capital gains on net capital held, all marked up for the deferred nature of depreciation tax allowances on that net capital held in the given year. Multiplying this ratio by net capital stock

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<sup>5</sup> Barkai (2020) divides his capital stock into nonresidential structures, equipment, and Intellectual Property Products (IPPs). The sectoral breakdown of the New Zealand national accounts has enabled us to exclude owner-occupied property but not all residential structures.

gives the economy-wide warranted cost of capital, and subtracting this from actual realised operating surplus provides our estimate of rent.

While on the face of it this seems a straightforward calculation, in practice it is far from simple. For a first run at the issue we assembled the data in Tables 3 and 4 to estimate the cost of capital in New Zealand 1939-2020.

Table 3 sets out a first estimate of the (nominal, pre-tax) warranted rate of return  $R$  for the period 1939-2019, and Figure 5 plots the various series. Table 4 then applies the estimated  $R$  to an estimate of the net capital stock at replacement cost in current prices, and derives the residual that we tentatively identify as the rent share. Figure 6 presents the results in different forms.

It is immediately apparent that the volatility of  $R$ , and hence of  $S^K$ , makes the picture rather confused. Nevertheless these preliminary estimates do show pronounced and sustained fall in the warranted rate of return between 1990 and 2020, from around 20% to around 10%, while panel (a) of Figure 6 includes what we think can reasonably be considered diverging trends for surplus and cost of capital since the 1980s. (The upward spike in  $R$  in the 2000s which upsets an otherwise clearcut picture is due entirely to the drop in capital goods inflation, which in fact is the cause of most of the volatility in  $R$ .)

These results are preliminary and need to be viewed with caution. We believe we have been conservative in the assumptions underlying Figure 6, using the top tax rate and using the WACC as our discount rate. Nevertheless there remains considerable further work to be done in finalising our numbers.

There would seem to be two immediate conclusions from Figures 5 and 6. The first is that over the period 1980-2019 (matching the period of Barkai (2020)) we have obtained results very similar to those of Barkai, showing a tendency towards a rising rent share from very little (indeed, negative) to around 15% of NDI and 40% of net surplus of the market sectors. In terms of dollar magnitudes, rents are estimated to be currently running at around \$30 billion annually. It should be noted that the Statistic NZ capital stock series we have used are inclusive of intangibles, so an explanation in terms of non-physical capital is not immediately available. Nevertheless, Barkai's characterisation of his rent as "pure profit" requires some care<sup>6</sup>.

The second point to emerge from our analysis is that by going back to earlier periods than were considered by Barkai, we have found evidence of a large rent share from the Second World War to the 1970s, which seems consistent with the predominance of a prospering

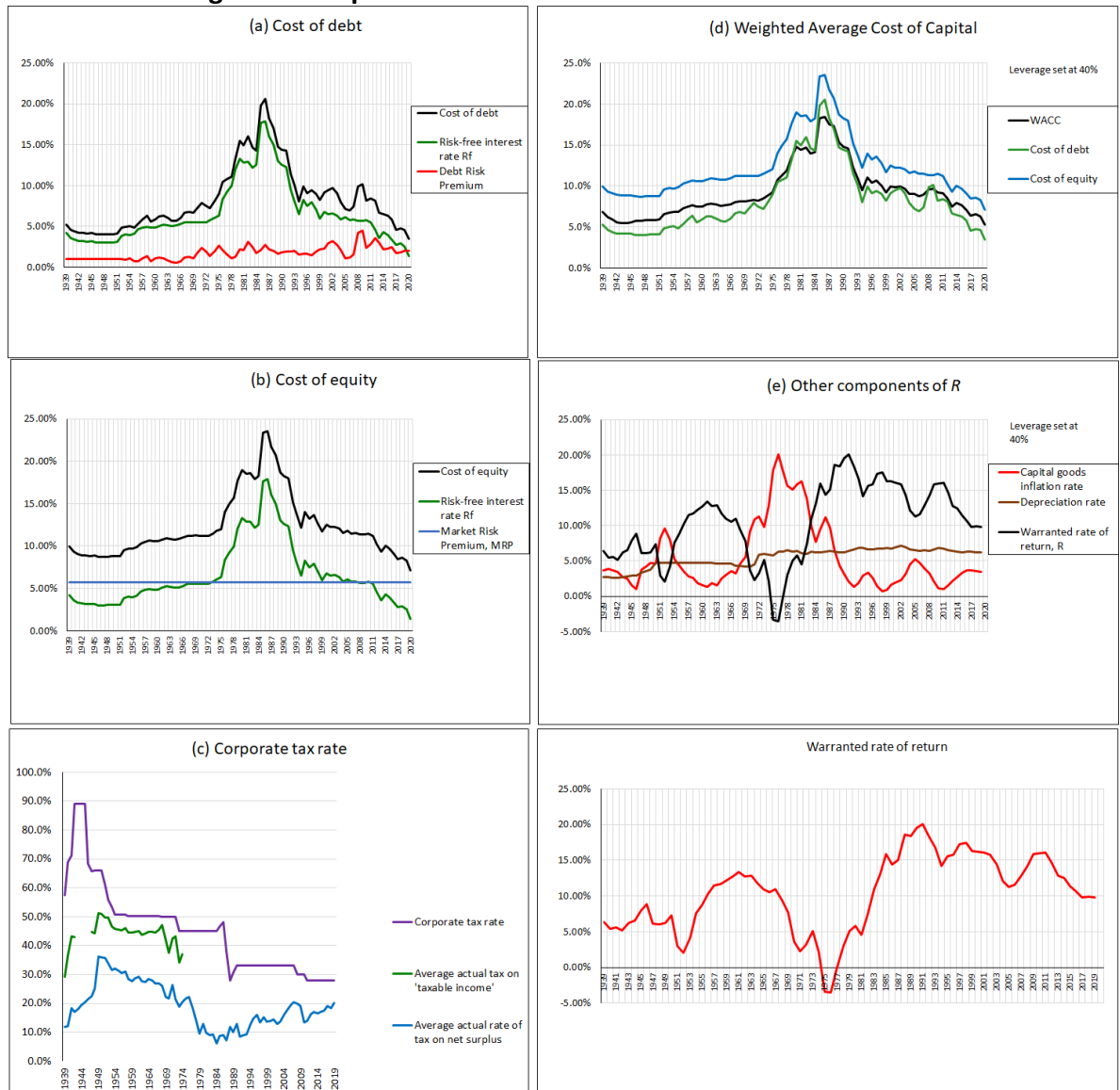
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<sup>6</sup> For a sceptical view on the attribution of "factorless income" as pure rent in the US context see Karabarbounis and Neiman 2018.

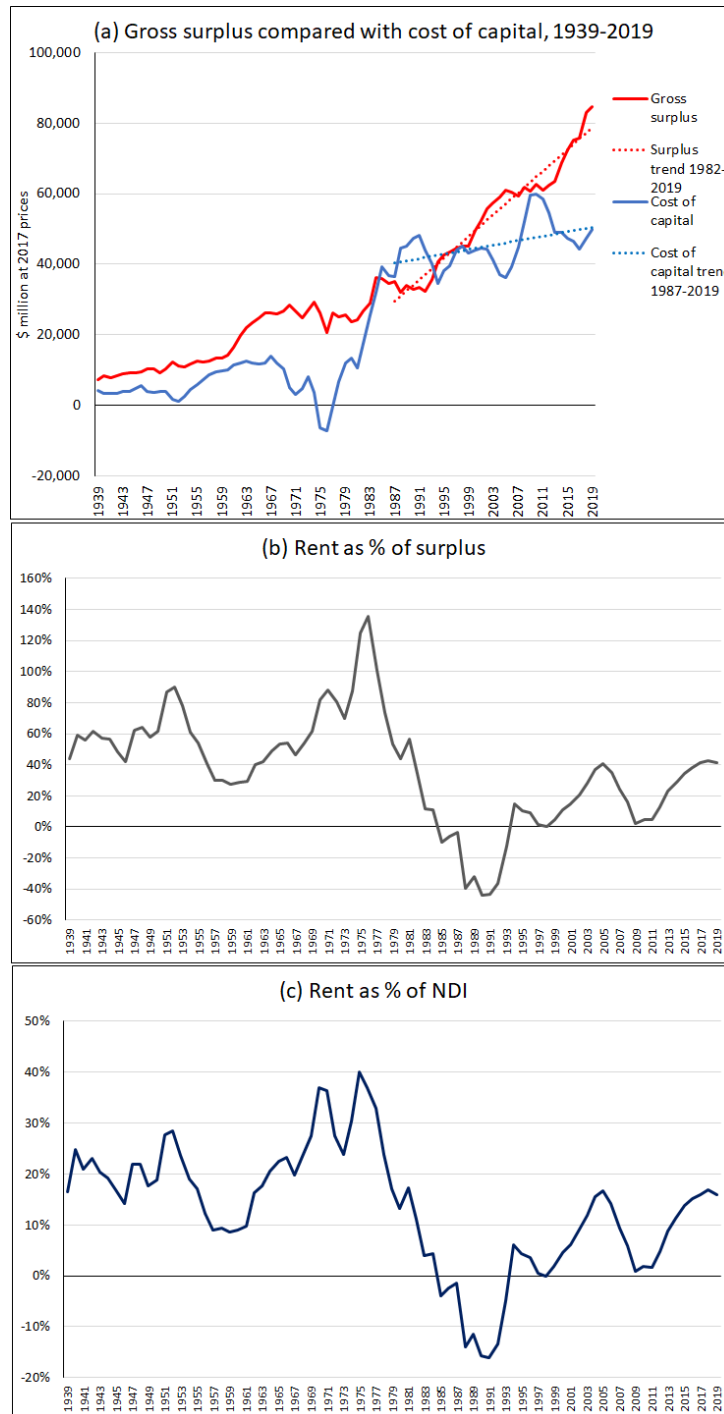
agricultural sector in the economy, particularly from the Korean War until the wool price collapse of the late 1960s.

We plan to re-work this analysis in a future revision of this paper, using an historic-cost reconstruction of the capital stock and capital costs, in place of the Statistics NZ replacement-cost capital stock series used here.

**Figure 5 Components of the warranted rate of return  $R$**



**Figure 6: Estimated rent**



#### 4. Conclusion

In this paper we have explored the degree to which available long-run statistical series for the New Zealand economy provide answers to the two questions posed at the start, namely (1) did the Employment Contracts Act 1991 really make the dramatic difference to the wage path that qualitative accounts suggest but that previous studies of the “wage share” had failed to find; and (2) is there statistical support for the proposition that deregulation of the New Zealand economy in the 1980s and

1990s was followed by an increase in the proportion of rents, as distinct from cost of capital, in the economy's operating surplus.

Our provisional answer to both these questions is yes, but with differing degrees of confidence. We have spent enough time on the labour-share work to be fully confident that we have identified a solid story. The rent-share analysis, in contrast, provides only a first-pass matching of Barkai's result, and requires considerably more thorough testing. The evidence of economy-wide rising markups since the 1980s nevertheless seems strongly to hint at an increase in the possession and exercise of market power in at least some key sectors.

**Table 1: Deriving the labour participation ratio and product-wage ratio, 1939-2019**

|      | (1)                               | (2)                              | (3)           | (4)                                   | (5)                                   | (6)                                     | (7)                                    | (8)                           | (9)                          | (10)                                             | (11)                                           | (12)                              | (13)                                             | (14)                                        | (15)                           |
|------|-----------------------------------|----------------------------------|---------------|---------------------------------------|---------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|------------------------------|--------------------------------------------------|------------------------------------------------|-----------------------------------|--------------------------------------------------|---------------------------------------------|--------------------------------|
|      | Adult population aged 16 and over | Employed wage and salary workers | Self-employed | Total employed labour force (2) + (3) | Labour participation ratio, (4) ÷ (1) | Net domestic product at factor cost \$m | Net national income at factor cost \$m | Compensation of employees \$m | Net self-employed income \$m | Net imputed rent of owner-occupied property, \$m | Imputed labour income of the self-employed \$m | Total labour income \$m (7) + (9) | Labour income per employed worker, \$ (10) ÷ (4) | Net national income per adult, \$ (6) ÷ (1) | Product-wage ratio (12) ÷ (13) |
| 1939 | 1,206,080                         | 545,965                          | 150,282       | 696,247                               | 57.7%                                 | 390                                     | 359                                    | 215                           | 83                           | 15                                               | 60                                             | 275                               | 395                                              | 298                                         | 1.33                           |
| 1940 | 1,209,706                         | 554,836                          | 146,655       | 701,491                               | 58.0%                                 | 421                                     | 390                                    | 218                           | 89                           | 15                                               | 57                                             | 276                               | 393                                              | 322                                         | 1.22                           |
| 1941 | 1,195,968                         | 563,708                          | 143,027       | 706,735                               | 59.1%                                 | 458                                     | 425                                    | 257                           | 87                           | 17                                               | 59                                             | 316                               | 447                                              | 356                                         | 1.26                           |
| 1942 | 1,194,909                         | 572,580                          | 139,399       | 711,979                               | 59.6%                                 | 501                                     | 467                                    | 281                           | 93                           | 17                                               | 62                                             | 343                               | 482                                              | 391                                         | 1.23                           |
| 1943 | 1,188,066                         | 581,451                          | 135,771       | 717,223                               | 60.4%                                 | 575                                     | 541                                    | 333                           | 101                          | 18                                               | 70                                             | 403                               | 561                                              | 455                                         | 1.23                           |
| 1944 | 1,202,262                         | 590,323                          | 132,143       | 722,467                               | 60.1%                                 | 642                                     | 606                                    | 383                           | 107                          | 19                                               | 75                                             | 458                               | 633                                              | 504                                         | 1.26                           |
| 1945 | 1,233,617                         | 599,195                          | 128,515       | 727,710                               | 59.0%                                 | 647                                     | 611                                    | 376                           | 118                          | 21                                               | 82                                             | 459                               | 630                                              | 495                                         | 1.27                           |
| 1946 | 1,282,427                         | 612,702                          | 134,769       | 747,471                               | 58.3%                                 | 679                                     | 644                                    | 388                           | 142                          | 22                                               | 101                                            | 488                               | 653                                              | 502                                         | 1.30                           |
| 1947 | 1,304,413                         | 626,210                          | 141,023       | 767,232                               | 58.8%                                 | 717                                     | 684                                    | 375                           | 196                          | 23                                               | 137                                            | 512                               | 668                                              | 524                                         | 1.27                           |
| 1948 | 1,320,676                         | 630,022                          | 145,044       | 775,066                               | 58.7%                                 | 806                                     | 769                                    | 417                           | 235                          | 25                                               | 168                                            | 584                               | 754                                              | 582                                         | 1.29                           |
| 1949 | 1,336,929                         | 634,919                          | 149,228       | 784,147                               | 58.7%                                 | 823                                     | 784                                    | 445                           | 244                          | 26                                               | 183                                            | 628                               | 801                                              | 587                                         | 1.37                           |
| 1950 | 1,352,235                         | 643,622                          | 154,245       | 797,867                               | 59.0%                                 | 928                                     | 893                                    | 490                           | 291                          | 29                                               | 218                                            | 708                               | 887                                              | 661                                         | 1.34                           |
| 1951 | 1,368,834                         | 645,511                          | 157,561       | 803,072                               | 58.7%                                 | 1,186                                   | 1,144                                  | 547                           | 466                          | 31                                               | 341                                            | 888                               | 1,106                                            | 835                                         | 1.32                           |
| 1952 | 1,393,214                         | 655,417                          | 162,716       | 818,133                               | 58.7%                                 | 1,212                                   | 1,165                                  | 646                           | 358                          | 34                                               | 264                                            | 910                               | 1,112                                            | 836                                         | 1.33                           |
| 1953 | 1,420,292                         | 675,376                          | 155,835       | 831,211                               | 58.5%                                 | 1,274                                   | 1,226                                  | 690                           | 382                          | 38                                               | 287                                            | 977                               | 1,175                                            | 863                                         | 1.36                           |
| 1954 | 1,442,370                         | 691,111                          | 162,140       | 853,251                               | 59.2%                                 | 1,420                                   | 1,369                                  | 763                           | 421                          | 42                                               | 313                                            | 1,076                             | 1,261                                            | 949                                         | 1.33                           |
| 1955 | 1,462,920                         | 709,498                          | 158,176       | 867,674                               | 59.3%                                 | 1,554                                   | 1,492                                  | 852                           | 437                          | 46                                               | 324                                            | 1,177                             | 1,356                                            | 1,020                                       | 1.33                           |
| 1956 | 1,486,027                         | 724,612                          | 157,588       | 882,200                               | 59.4%                                 | 1,633                                   | 1,570                                  | 924                           | 447                          | 49                                               | 340                                            | 1,264                             | 1,433                                            | 1,057                                       | 1.36                           |
| 1957 | 1,515,172                         | 743,747                          | 155,853       | 899,600                               | 59.4%                                 | 1,718                                   | 1,648                                  | 975                           | 475                          | 53                                               | 363                                            | 1,339                             | 1,488                                            | 1,088                                       | 1.37                           |
| 1958 | 1,544,511                         | 759,345                          | 148,155       | 907,500                               | 58.8%                                 | 1,834                                   | 1,762                                  | 1,052                         | 477                          | 55                                               | 361                                            | 1,413                             | 1,557                                            | 1,141                                       | 1.36                           |
| 1959 | 1,567,241                         | 774,896                          | 157,304       | 932,200                               | 59.5%                                 | 1,895                                   | 1,814                                  | 1,097                         | 468                          | 57                                               | 351                                            | 1,447                             | 1,552                                            | 1,157                                       | 1.34                           |
| 1960 | 1,585,673                         | 807,412                          | 144,588       | 952,000                               | 60.0%                                 | 2,037                                   | 1,959                                  | 1,161                         | 524                          | 58                                               | 392                                            | 1,553                             | 1,631                                            | 1,236                                       | 1.32                           |
| 1961 | 1,610,745                         | 839,427                          | 137,273       | 976,700                               | 60.6%                                 | 2,215                                   | 2,120                                  | 1,254                         | 538                          | 58                                               | 391                                            | 1,645                             | 1,684                                            | 1,316                                       | 1.28                           |

|      |           |           |         |           |       |        |        |        |       |       |       |        |        |        |      |
|------|-----------|-----------|---------|-----------|-------|--------|--------|--------|-------|-------|-------|--------|--------|--------|------|
| 1962 | 1,646,509 | 851,271   | 141,829 | 993,100   | 60.3% | 2,377  | 2,277  | 1,339  | 511   | 69    | 377   | 1,716  | 1,728  | 1,383  | 1.25 |
| 1963 | 1,681,989 | 876,913   | 135,287 | 1,012,200 | 60.2% | 2,602  | 2,463  | 1,419  | 564   | 93    | 407   | 1,826  | 1,804  | 1,465  | 1.23 |
| 1964 | 1,719,424 | 910,945   | 137,355 | 1,048,300 | 61.0% | 2,838  | 2,698  | 1,525  | 632   | 98    | 452   | 1,977  | 1,886  | 1,569  | 1.20 |
| 1965 | 1,753,844 | 945,564   | 138,436 | 1,084,000 | 61.8% | 3,115  | 2,946  | 1,689  | 655   | 110   | 465   | 2,154  | 1,987  | 1,680  | 1.18 |
| 1966 | 1,790,026 | 984,016   | 145,984 | 1,130,000 | 63.1% | 3,363  | 3,181  | 1,854  | 667   | 124   | 469   | 2,323  | 2,056  | 1,777  | 1.16 |
| 1967 | 1,823,846 | 973,451   | 176,649 | 1,150,100 | 63.1% | 3,468  | 3,269  | 2,003  | 608   | 130   | 451   | 2,454  | 2,134  | 1,792  | 1.19 |
| 1968 | 1,843,327 | 978,959   | 155,841 | 1,134,800 | 61.6% | 3,598  | 3,397  | 2,088  | 597   | 142   | 443   | 2,531  | 2,231  | 1,843  | 1.21 |
| 1969 | 1,864,682 | 1,021,650 | 142,750 | 1,164,400 | 62.4% | 3,795  | 3,563  | 2,200  | 619   | 148   | 452   | 2,652  | 2,278  | 1,911  | 1.19 |
| 1970 | 1,898,369 | 1,084,453 | 132,447 | 1,216,900 | 64.1% | 4,212  | 3,951  | 2,444  | 663   | 160   | 481   | 2,925  | 2,403  | 2,081  | 1.15 |
| 1971 | 1,935,448 | 1,107,159 | 145,241 | 1,252,400 | 64.7% | 4,791  | 4,536  | 2,945  | 725   | 178   | 547   | 3,492  | 2,789  | 2,344  | 1.19 |
| 1972 | 1,977,669 | 1,128,365 | 141,335 | 1,269,700 | 64.2% | 5,524  | 5,246  | 3,378  | 914   | 193   | 699   | 4,077  | 3,211  | 2,653  | 1.21 |
| 1973 | 2,030,440 | 1,173,483 | 141,017 | 1,314,500 | 64.7% | 6,358  | 6,016  | 3,797  | 1,172 | 212   | 895   | 4,692  | 3,569  | 2,963  | 1.20 |
| 1974 | 2,088,425 | 1,211,721 | 172,379 | 1,384,100 | 66.3% | 7,489  | 7,089  | 4,481  | 1,303 | 257   | 985   | 5,466  | 3,949  | 3,394  | 1.16 |
| 1975 | 2,144,099 | 1,223,016 | 189,384 | 1,412,400 | 65.9% | 8,160  | 7,715  | 5,397  | 1,098 | 306   | 877   | 6,274  | 4,442  | 3,598  | 1.23 |
| 1976 | 2,178,051 | 1,246,992 | 190,108 | 1,437,100 | 66.0% | 8,900  | 8,239  | 6,230  | 1,472 | 407   | 1,306 | 7,536  | 5,244  | 3,783  | 1.39 |
| 1977 | 2,204,233 | 1,267,620 | 187,480 | 1,455,100 | 66.0% | 10,757 | 9,835  | 7,015  | 1,861 | 484   | 1,552 | 8,567  | 5,888  | 4,462  | 1.32 |
| 1978 | 2,226,728 | 1,262,290 | 192,610 | 1,454,900 | 65.3% | 11,870 | 10,831 | 8,050  | 1,813 | 578   | 1,540 | 9,590  | 6,591  | 4,864  | 1.36 |
| 1979 | 2,243,358 | 1,251,249 | 229,051 | 1,480,300 | 66.0% | 13,528 | 12,398 | 9,352  | 2,004 | 547   | 1,708 | 11,060 | 7,471  | 5,527  | 1.35 |
| 1980 | 2,269,550 | 1,268,073 | 238,427 | 1,506,500 | 66.4% | 15,642 | 14,577 | 10,906 | 2,587 | 537   | 2,254 | 13,160 | 8,735  | 6,423  | 1.36 |
| 1981 | 2,295,732 | 1,309,918 | 194,582 | 1,504,500 | 65.5% | 18,259 | 17,104 | 12,979 | 2,663 | 539   | 2,295 | 15,274 | 10,152 | 7,450  | 1.36 |
| 1982 | 2,330,601 | 1,309,782 | 211,018 | 1,520,800 | 65.3% | 22,426 | 20,961 | 15,653 | 3,137 | 676   | 2,638 | 18,291 | 12,027 | 8,994  | 1.34 |
| 1983 | 2,379,706 | 1,291,136 | 224,564 | 1,515,700 | 63.7% | 25,194 | 23,332 | 17,160 | 3,355 | 835   | 2,741 | 19,901 | 13,130 | 9,805  | 1.34 |
| 1984 | 2,417,813 | 1,295,361 | 242,239 | 1,537,600 | 63.6% | 28,131 | 25,528 | 17,504 | 3,812 | 1,068 | 2,869 | 20,373 | 13,250 | 10,558 | 1.25 |
| 1985 | 2,446,754 | 1,335,941 | 267,659 | 1,603,600 | 65.5% | 31,452 | 27,803 | 19,168 | 4,531 | 1,387 | 3,401 | 22,569 | 14,074 | 11,363 | 1.24 |
| 1986 | 2,465,624 | 1,339,400 | 286,600 | 1,626,000 | 65.9% | 36,160 | 31,087 | 22,583 | 4,809 | 2,194 | 3,725 | 26,308 | 16,179 | 12,608 | 1.28 |
| 1987 | 2,501,410 | 1,322,300 | 296,900 | 1,619,200 | 64.7% | 42,758 | 37,497 | 26,992 | 5,212 | 2,290 | 3,990 | 30,982 | 19,134 | 14,990 | 1.28 |
| 1988 | 2,525,626 | 1,319,400 | 296,700 | 1,616,100 | 64.0% | 46,984 | 40,779 | 30,144 | 6,504 | 2,660 | 5,184 | 35,328 | 21,860 | 16,146 | 1.35 |
| 1989 | 2,543,875 | 1,257,400 | 298,300 | 1,555,700 | 61.2% | 51,102 | 44,542 | 31,508 | 7,230 | 3,412 | 5,630 | 37,138 | 23,872 | 17,510 | 1.36 |
| 1990 | 2,574,517 | 1,222,500 | 300,800 | 1,523,300 | 59.2% | 53,077 | 46,037 | 32,442 | 7,955 | 3,695 | 6,230 | 38,672 | 25,387 | 17,882 | 1.42 |
| 1991 | 2,611,178 | 1,226,800 | 304,200 | 1,531,000 | 58.6% | 54,008 | 46,575 | 32,849 | 7,203 | 4,259 | 5,561 | 38,410 | 25,088 | 17,837 | 1.41 |
| 1992 | 2,642,900 | 1,190,700 | 315,800 | 1,506,500 | 57.0% | 53,632 | 44,078 | 32,534 | 7,896 | 4,443 | 6,221 | 38,755 | 25,725 | 16,678 | 1.54 |

|      |           |           |         |           |       |         |         |         |        |        |        |         |        |        |      |
|------|-----------|-----------|---------|-----------|-------|---------|---------|---------|--------|--------|--------|---------|--------|--------|------|
| 1993 | 2,672,900 | 1,193,700 | 324,400 | 1,518,100 | 56.8% | 55,572  | 46,292  | 33,219  | 7,660  | 4,212  | 5,823  | 39,042  | 25,718 | 17,319 | 1.48 |
| 1994 | 2,706,300 | 1,224,000 | 334,800 | 1,558,800 | 57.6% | 60,906  | 50,620  | 34,766  | 8,735  | 4,195  | 6,330  | 41,096  | 26,364 | 18,705 | 1.41 |
| 1995 | 2,743,000 | 1,289,900 | 341,400 | 1,631,300 | 59.5% | 65,697  | 55,309  | 37,088  | 9,445  | 4,242  | 6,735  | 43,823  | 26,864 | 20,164 | 1.33 |
| 1996 | 2,785,500 | 1,338,400 | 363,000 | 1,701,400 | 61.1% | 70,020  | 59,183  | 39,329  | 10,299 | 4,790  | 7,374  | 46,703  | 27,450 | 21,247 | 1.29 |
| 1997 | 2,830,000 | 1,381,700 | 364,200 | 1,745,900 | 61.7% | 73,654  | 60,975  | 41,970  | 10,235 | 5,150  | 7,372  | 49,342  | 28,262 | 21,546 | 1.31 |
| 1998 | 2,866,800 | 1,401,600 | 348,700 | 1,750,300 | 61.1% | 76,548  | 64,818  | 43,707  | 10,645 | 5,448  | 7,696  | 51,403  | 29,368 | 22,610 | 1.30 |
| 1999 | 2,891,400 | 1,381,800 | 358,600 | 1,740,400 | 60.2% | 77,834  | 67,450  | 44,714  | 11,258 | 5,492  | 8,241  | 52,955  | 30,427 | 23,328 | 1.30 |
| 2000 | 2,910,700 | 1,403,300 | 370,500 | 1,773,800 | 60.9% | 83,155  | 70,914  | 45,817  | 13,051 | 5,466  | 9,251  | 55,068  | 31,045 | 24,363 | 1.27 |
| 2001 | 2,931,400 | 1,435,100 | 374,100 | 1,809,200 | 61.7% | 87,860  | 75,636  | 48,141  | 13,942 | 5,416  | 9,798  | 57,939  | 32,025 | 25,802 | 1.24 |
| 2002 | 2,963,800 | 1,496,200 | 365,600 | 1,861,800 | 62.8% | 95,012  | 83,039  | 51,721  | 15,094 | 5,461  | 10,485 | 62,206  | 33,412 | 28,018 | 1.19 |
| 2003 | 3,026,400 | 1,543,100 | 369,700 | 1,912,800 | 63.2% | 99,741  | 87,137  | 55,130  | 13,894 | 5,794  | 9,568  | 64,698  | 33,824 | 28,792 | 1.17 |
| 2004 | 3,093,500 | 1,591,300 | 377,900 | 1,969,200 | 63.7% | 107,222 | 94,227  | 59,373  | 15,626 | 6,129  | 10,855 | 70,228  | 35,663 | 30,460 | 1.17 |
| 2005 | 3,146,700 | 1,649,400 | 390,900 | 2,040,300 | 64.8% | 114,666 | 99,534  | 64,347  | 15,802 | 6,425  | 11,000 | 75,347  | 36,929 | 31,631 | 1.17 |
| 2006 | 3,194,000 | 1,709,800 | 387,000 | 2,096,800 | 65.6% | 120,388 | 103,104 | 69,696  | 15,312 | 6,756  | 10,854 | 80,550  | 38,416 | 32,281 | 1.19 |
| 2007 | 3,242,800 | 1,766,200 | 374,800 | 2,141,000 | 66.0% | 126,089 | 107,504 | 74,449  | 17,423 | 7,035  | 12,763 | 87,212  | 40,734 | 33,152 | 1.23 |
| 2008 | 3,279,500 | 1,783,000 | 381,700 | 2,164,700 | 66.0% | 138,360 | 117,490 | 80,781  | 20,688 | 7,555  | 15,177 | 95,958  | 44,328 | 35,826 | 1.24 |
| 2009 | 3,311,700 | 1,815,699 | 361,301 | 2,177,000 | 65.7% | 138,618 | 117,512 | 85,104  | 16,938 | 7,362  | 12,609 | 97,713  | 44,884 | 35,484 | 1.26 |
| 2010 | 3,353,200 | 1,780,132 | 362,768 | 2,142,900 | 63.9% | 141,407 | 126,874 | 85,822  | 18,575 | 6,568  | 13,711 | 99,533  | 46,448 | 37,837 | 1.23 |
| 2011 | 3,391,400 | 1,790,328 | 372,072 | 2,162,400 | 63.8% | 148,542 | 130,846 | 88,831  | 21,259 | 7,588  | 15,777 | 104,608 | 48,376 | 38,582 | 1.25 |
| 2012 | 3,420,400 | 1,811,662 | 376,738 | 2,188,400 | 64.0% | 155,497 | 137,724 | 92,305  | 22,681 | 8,117  | 16,789 | 109,094 | 49,851 | 40,265 | 1.24 |
| 2013 | 3,446,700 | 1,806,696 | 373,904 | 2,180,600 | 63.3% | 158,020 | 140,441 | 95,053  | 20,450 | 8,527  | 15,063 | 110,116 | 50,498 | 40,747 | 1.24 |
| 2014 | 3,491,100 | 1,860,490 | 385,110 | 2,245,600 | 64.3% | 170,829 | 152,651 | 98,754  | 25,260 | 9,002  | 18,266 | 117,020 | 52,111 | 43,726 | 1.19 |
| 2015 | 3,568,200 | 1,934,092 | 395,008 | 2,329,100 | 65.3% | 177,709 | 158,385 | 104,376 | 22,297 | 9,550  | 15,955 | 120,331 | 51,664 | 44,388 | 1.16 |
| 2016 | 3,657,400 | 1,983,680 | 398,220 | 2,381,900 | 65.1% | 185,772 | 167,344 | 109,939 | 23,181 | 9,957  | 16,697 | 126,636 | 53,166 | 45,755 | 1.16 |
| 2017 | 3,752,200 | 2,097,183 | 421,117 | 2,518,300 | 67.1% | 197,515 | 178,168 | 115,703 | 28,609 | 10,609 | 20,911 | 136,614 | 54,248 | 47,484 | 1.14 |
| 2018 | 3,837,200 | 2,184,832 | 420,468 | 2,605,300 | 67.9% | 213,610 | 191,184 | 122,805 | 30,557 | 11,509 | 21,875 | 144,680 | 55,533 | 49,824 | 1.11 |
| 2019 | 3,911,900 | 2,233,588 | 428,312 | 2,661,900 | 68.0% | 224,162 | 201,251 | 130,353 | 32,426 | 11,950 | 23,510 | 153,863 | 57,802 | 51,446 | 1.12 |

### Table 1 Sources:

#### Column (1) Adult population aged 16 and over

1992-2020: Calculated from Estimated Resident Population by Age and Sex (1991+) (Annual-Mar):  
Infoshare series DPE055AA, mean over the March year.

1939-1991: Estimated De Facto Population by Age and Sex (1936-95) (Annual-Dec) (discontinued):  
Infoshare series DPE067AA, mean for years ended December (other year ends not available). Chain linked to match the 1992-2020 series at 1992.

#### Column (2) Employed wage and salary earners

1987 onwards is annual to March, series HLFA.SLA3HA from Infoshare table HLF002AA. Note that SNZ made a significant change to the survey in June 2016 to recognise growing mismeasurement of self-employed, which appears to have started around 2009. This created a break in June 2016 (as seen in a sudden increase in the ratio of self-employed to wage and salary earners). It is adjusted for by estimating employee numbers and self-employed numbers by maintaining the same ratio to total employed as shown in LEED annual data for main jobs from 2009 onwards.

1986 is for March quarter from HLFS (HLF001AA)

1939-1985 series is constructed from the census-year figures assembled in the table "Labour force: 100 years full-time labour force 1896-1996", *New Zealand Official Yearbook 2000* p.318, the series for total employment in Chapple (1994), and the ratio of wage and salary earners to total employed. For details see Rosenberg (2017b) pp.11-12.

#### Column (3) Self-employed is calculated as the difference between Columns (4) and (2).

#### Column (4) Total employed labour force:

1986-present: series HLFA.SLA3HZ from Infoshare table HLF002AA (Total All Employment Status, Annual March).

1956-1985 from Chapple (1994).

1947-1955: Census figures interpolated to match the trend in Total Labour Force in the table "Labour Force, Unemployment, and Industrial Stoppages", *New Zealand Official Yearbook 1976* p.980.

1939-1946: Census data for 1936, 1945, 1951 from 2000 NZOYB, p.318, "Labour force: 100 years. Full time labour force 1896-1996", interpolated in equal annual steps.

#### Column (5) Labour participation rate calculated as Column (4) divided by Column (1).

#### Column (6) Net Domestic Product at factor cost

1972-2020 series SNEA.SG01NAC00B01 (GDP- production measure) from Infoshare table SNE038AA, minus series SNEA.SG05NAC04K10ZZ9 (consumption of fixed capital) from Infoshare table SNE106AA.

1962-1971 series SNAA.SHB (net operating surplus) plus SNAA.SHA (compensation of employees) from Infoshare table SNA004AA, adjusted down slightly to reflect apparent understatement of depreciation in SNAA.SHC.

1939-61 series ONAA.SAH (National income at factor cost) plus ONAA.SAV (net factor payments to rest of world) both from Infoshare table ONA001AA. Some missing years 1940-43 and 1945-46 interpolated.

#### Column (7) Net national income at factor cost:

1972-2020 is the sum of series SNEA.SG03NAC01D10T4 (compensation of employees, from Infoshare Table SNE088AA) and net national operating surplus {calculated as series SNEA.SG03NAC01B02T4 (gross [domestic] operating surplus, from Infoshare Table SNE088AA) minus series SNEA.SG02NAC01K10T4 (consumption of fixed capital from Infoshare Table SNE025AA) plus series SNEA.SG06NAC00D40 (net investment income from rest of world, from Infoshare Table SNE111AA)}.

1962-1971 is the series in Column (6) plus net factor payments from rest of world series BOPA.S4AC3B2 from Infoshare table BOP009AA.

1939-1972 is series ONAA.SAA (Salary and wages and pay and allowances of armed forces) from Infoshare table ONA001AA, scaled to match SNA004AA at 1962, plus net national operating surplus, which is first calculated as the difference between series ONAA.SAH (national income at factor cost) and series ONAA.SAA (Salary and wages and pay and

allowances of armed forces) and then scaled to link with the net surplus measure from the SNA data at 1962.

Column (8) Compensation of employees

1972-2020 is series SNEA.SG03NAC00D10 from Infoshare table SNE087AA.

1962-1971 is series SNAA.SHA from Infoshare table SNA004AA.

1939-1961 is series ONA.SAA from Infoshare ONA001AA, chain-linked to the SNA data at 1962.

Column (9) Net self-employed income:

1987-2020 is the sum of farm and non-farm entrepreneurial income, series SNEA.S2NB4100S500C1 and SNEA.S2NB4200S500C1, from Infoshare table SNE205AA downloaded 15 May 2021.

1972-1987 we take the sum of farm and non-farm entrepreneurial income, series SNBA.S1BC and SNBA.S1BD respectively from Infoshare table SNB028AA, and scale the resulting series down so that it matches up with the SNEA series at 1987.

1939-1971 we calculate total "personal income", excluding interest and rent, from Old National Accounts data in the *New Zealand Official Yearbook* 1950 p.1062, 1966 p.716, 1969 p.712, 1971 p.712, and 1972 p. and scale the resulting series up to link with the scaled SNBA data at 1972.

Column (10) Net imputed rent on owner-occupied property:

1972-2020 is series SNEA.SG03NAC04B02LL2 (gross owner-occupied property surplus) from Infoshare SNE089AA, minus SNEA.SG05NAC04K10LL2 (consumption of fixed capital, owner-occupied property) from Infoshare SNE106AA.

1939-1971 back-casts from the 1972 SNEA figure, by applying the trend of series ONAA.SAB (rental value of owner-occupied houses) from Infoshare ONA001AA.

Column (11) estimates the labour-income share of self-employed income by multiplying Column (9) by the ratio of wages and salaries (Column 8) to total surplus in the total economy excluding self-employed income and owner-occupied property. That surplus is calculated by subtracting Columns (1) and (8)

from Column (6). The formula is thus  $Column(11) = Column(9) \times \frac{Column(8)}{[Column(6) - Column(10) - Column(8)]}$ .

Columns (12), (13), (14) and (15) are calculated as shown.

**Table 2: Markups 1972-2019**

|      | Whole economy |                                           |                                                   |                                             |                                                         |                                                                     |                                                                                                               | Private market sector |                                           |                                          |                                                      |                                                                  |
|------|---------------|-------------------------------------------|---------------------------------------------------|---------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------|------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|
|      | (1)           | (2)                                       | (3)                                               | (4)                                         | (5)                                                     | (6)                                                                 | (7)                                                                                                           | (8)                   | (9)                                       | (10)                                     | (11)                                                 | (12)                                                             |
|      | Output<br>\$m | Intermed-<br>iate Consumpt-<br>ion<br>\$m | Compens-<br>ation of<br>Employees<br>(CoE)<br>\$m | Consumpt-<br>ion of fixed<br>capital<br>\$m | Markup<br>on<br>Intermed-<br>iate Consumpt-<br>ion<br>% | Markup<br>on<br>Intermed-<br>iate Consumpt-<br>ion plus<br>CoE<br>% | Markup on<br>Intermediate<br>Consumption<br>plus CoE,<br>excluding<br>consumption<br>of fixed<br>capital<br>% | Output<br>\$m         | Intermed-<br>iate Consumpt-<br>ion<br>\$m | Compensat-<br>ion of<br>Employees<br>\$m | Markup on<br>Intermed-<br>iate Consumpt-<br>ion<br>% | Markup on<br>Intermed-<br>iate Consumpt-<br>ion plus<br>COE<br>% |
|      |               |                                           |                                                   |                                             | $[(1)-(2)] \div (2)$                                    | $[(1)-(2)-(3)] \div [(2)+(3)]$                                      | $[(1)-(4)-(2)-(3)] \div [(2)+(3)]$                                                                            |                       |                                           |                                          | $[(8)-(9)] \div (9)$                                 | $[(8)-(9)-(10)] \div [(9)+(10)]$                                 |
| 1972 | 13,559        | 6,791                                     | 3,378                                             | 777                                         | 99.7%                                                   | 33.3%                                                               | 25.7%                                                                                                         | 11,007                | 5,794                                     | 2,183                                    | 90.0%                                                | 38.0%                                                            |
| 1973 | 15,904        | 8,135                                     | 3,797                                             | 889                                         | 95.5%                                                   | 33.3%                                                               | 25.8%                                                                                                         | 13,047                | 7,035                                     | 2,445                                    | 85.5%                                                | 37.6%                                                            |
| 1974 | 18,635        | 9,577                                     | 4,481                                             | 1,028                                       | 94.6%                                                   | 32.6%                                                               | 25.2%                                                                                                         | 15,407                | 8,366                                     | 2,900                                    | 84.2%                                                | 36.8%                                                            |
| 1975 | 21,169        | 11,220                                    | 5,397                                             | 1,278                                       | 88.7%                                                   | 27.4%                                                               | 19.7%                                                                                                         | 17,326                | 9,645                                     | 3,503                                    | 79.6%                                                | 31.8%                                                            |
| 1976 | 24,945        | 13,700                                    | 6,230                                             | 1,780                                       | 82.1%                                                   | 25.2%                                                               | 16.2%                                                                                                         | 20,302                | 11,725                                    | 3,967                                    | 73.2%                                                | 29.4%                                                            |
| 1977 | 30,771        | 16,982                                    | 7,015                                             | 2,154                                       | 81.2%                                                   | 28.2%                                                               | 19.3%                                                                                                         | 25,188                | 14,679                                    | 4,510                                    | 71.6%                                                | 31.3%                                                            |
| 1978 | 34,177        | 18,707                                    | 8,050                                             | 2,587                                       | 82.7%                                                   | 27.7%                                                               | 18.1%                                                                                                         | 27,385                | 15,838                                    | 5,054                                    | 72.9%                                                | 31.1%                                                            |
| 1979 | 38,299        | 20,758                                    | 9,352                                             | 2,911                                       | 84.5%                                                   | 27.2%                                                               | 17.5%                                                                                                         | 30,305                | 17,488                                    | 5,667                                    | 73.3%                                                | 30.9%                                                            |
| 1980 | 45,448        | 24,993                                    | 10,906                                            | 3,413                                       | 81.8%                                                   | 26.6%                                                               | 17.1%                                                                                                         | 36,096                | 21,292                                    | 6,616                                    | 69.5%                                                | 29.3%                                                            |
| 1981 | 52,717        | 28,899                                    | 12,979                                            | 3,837                                       | 82.4%                                                   | 25.9%                                                               | 16.7%                                                                                                         | 41,455                | 24,386                                    | 7,736                                    | 70.0%                                                | 29.1%                                                            |
| 1982 | 64,408        | 35,473                                    | 15,653                                            | 4,572                                       | 81.6%                                                   | 26.0%                                                               | 17.0%                                                                                                         | 51,027                | 30,124                                    | 9,375                                    | 69.4%                                                | 29.2%                                                            |
| 1983 | 72,809        | 40,043                                    | 17,160                                            | 5,309                                       | 81.8%                                                   | 27.3%                                                               | 18.0%                                                                                                         | 57,222                | 33,513                                    | 10,318                                   | 70.7%                                                | 30.6%                                                            |
| 1984 | 80,380        | 43,885                                    | 17,504                                            | 5,654                                       | 83.2%                                                   | 30.9%                                                               | 21.7%                                                                                                         | 63,554                | 36,775                                    | 10,528                                   | 72.8%                                                | 34.4%                                                            |
| 1985 | 93,506        | 52,406                                    | 19,168                                            | 6,417                                       | 78.4%                                                   | 30.6%                                                               | 21.7%                                                                                                         | 75,009                | 44,274                                    | 11,888                                   | 69.4%                                                | 33.6%                                                            |
| 1986 | 107,784       | 60,173                                    | 22,583                                            | 7,611                                       | 79.1%                                                   | 30.2%                                                               | 21.0%                                                                                                         | 85,371                | 50,016                                    | 14,028                                   | 70.7%                                                | 33.3%                                                            |
| 1987 | 123,093       | 67,379                                    | 26,992                                            | 8,808                                       | 82.7%                                                   | 30.4%                                                               | 21.1%                                                                                                         | 95,946                | 55,491                                    | 16,383                                   | 72.9%                                                | 33.5%                                                            |
| 1988 | 133,711       | 72,921                                    | 30,144                                            | 9,458                                       | 83.4%                                                   | 29.7%                                                               | 20.6%                                                                                                         | 103,820               | 59,855                                    | 18,405                                   | 73.5%                                                | 32.7%                                                            |
| 1989 | 141,537       | 75,526                                    | 31,508                                            | 9,884                                       | 87.4%                                                   | 32.2%                                                               | 23.0%                                                                                                         | 111,129               | 62,978                                    | 19,011                                   | 76.5%                                                | 35.5%                                                            |
| 1990 | 148,891       | 79,830                                    | 32,442                                            | 10,543                                      | 86.5%                                                   | 32.6%                                                               | 23.2%                                                                                                         | 119,294               | 67,784                                    | 20,413                                   | 76.0%                                                | 35.3%                                                            |
| 1991 | 150,721       | 80,029                                    | 32,849                                            | 11,294                                      | 88.3%                                                   | 33.5%                                                               | 23.5%                                                                                                         | 122,082               | 68,081                                    | 21,221                                   | 79.3%                                                | 36.7%                                                            |
| 1992 | 151,398       | 80,794                                    | 32,534                                            | 11,794                                      | 87.4%                                                   | 33.6%                                                               | 23.2%                                                                                                         | 124,165               | 69,290                                    | 21,521                                   | 79.2%                                                | 36.7%                                                            |
| 1993 | 159,275       | 86,479                                    | 33,219                                            | 12,250                                      | 84.2%                                                   | 33.1%                                                               | 22.8%                                                                                                         | 131,910               | 74,777                                    | 22,389                                   | 76.4%                                                | 35.8%                                                            |

|      |         |         |         |        |       |       |       |         |         |        |       |       |
|------|---------|---------|---------|--------|-------|-------|-------|---------|---------|--------|-------|-------|
| 1994 | 172,067 | 93,459  | 34,766  | 12,637 | 84.1% | 34.2% | 24.3% | 144,951 | 82,061  | 24,154 | 76.6% | 36.5% |
| 1995 | 183,259 | 99,350  | 37,088  | 13,121 | 84.5% | 34.3% | 24.7% | 155,422 | 87,429  | 26,341 | 77.8% | 36.6% |
| 1996 | 193,101 | 103,981 | 39,329  | 13,815 | 85.7% | 34.7% | 25.1% | 164,459 | 91,759  | 28,198 | 79.2% | 37.1% |
| 1997 | 201,872 | 108,313 | 41,970  | 14,516 | 86.4% | 34.3% | 24.7% | 172,516 | 96,132  | 30,357 | 79.5% | 36.4% |
| 1998 | 208,069 | 110,937 | 43,707  | 14,958 | 87.6% | 34.5% | 24.9% | 177,170 | 97,953  | 31,562 | 80.9% | 36.8% |
| 1999 | 212,296 | 112,922 | 44,714  | 15,673 | 88.0% | 34.7% | 24.7% | 180,463 | 99,551  | 32,011 | 81.3% | 37.2% |
| 2000 | 228,344 | 122,999 | 45,817  | 16,129 | 85.6% | 35.3% | 25.7% | 196,597 | 109,866 | 32,902 | 78.9% | 37.7% |
| 2001 | 248,928 | 137,293 | 48,141  | 17,574 | 81.3% | 34.2% | 24.8% | 215,584 | 123,071 | 34,763 | 75.2% | 36.6% |
| 2002 | 265,217 | 145,244 | 51,721  | 18,527 | 82.6% | 34.7% | 25.2% | 227,543 | 128,062 | 37,234 | 77.7% | 37.7% |
| 2003 | 275,517 | 149,909 | 55,130  | 18,920 | 83.8% | 34.4% | 25.1% | 233,700 | 130,493 | 39,335 | 79.1% | 37.6% |
| 2004 | 289,382 | 155,151 | 59,373  | 19,691 | 86.5% | 34.9% | 25.7% | 245,058 | 135,133 | 42,263 | 81.3% | 38.1% |
| 2005 | 311,201 | 167,757 | 64,347  | 21,091 | 85.5% | 34.1% | 25.0% | 263,734 | 146,169 | 45,823 | 80.4% | 37.4% |
| 2006 | 330,470 | 179,318 | 69,696  | 22,661 | 84.3% | 32.7% | 23.6% | 277,235 | 154,513 | 49,643 | 79.4% | 35.8% |
| 2007 | 345,449 | 186,671 | 74,449  | 24,758 | 85.1% | 32.3% | 22.8% | 289,767 | 161,041 | 52,914 | 79.9% | 35.4% |
| 2008 | 377,994 | 205,429 | 80,781  | 26,062 | 84.0% | 32.1% | 23.0% | 316,571 | 176,622 | 57,511 | 79.2% | 35.2% |
| 2009 | 384,566 | 209,202 | 85,104  | 28,551 | 83.8% | 30.7% | 21.0% | 319,852 | 179,656 | 59,585 | 78.0% | 33.7% |
| 2010 | 381,781 | 201,661 | 85,822  | 29,963 | 89.3% | 32.8% | 22.4% | 316,162 | 172,970 | 59,171 | 82.8% | 36.2% |
| 2011 | 399,639 | 212,235 | 88,831  | 29,971 | 88.3% | 32.7% | 22.8% | 331,425 | 182,619 | 61,066 | 81.5% | 36.0% |
| 2012 | 418,323 | 223,122 | 92,305  | 30,308 | 87.5% | 32.6% | 23.0% | 345,551 | 190,380 | 63,689 | 81.5% | 36.0% |
| 2013 | 427,250 | 228,155 | 95,053  | 31,029 | 87.3% | 32.2% | 22.6% | 354,040 | 195,891 | 65,753 | 80.7% | 35.3% |
| 2014 | 456,127 | 242,533 | 98,754  | 31,986 | 88.1% | 33.6% | 24.3% | 381,407 | 210,252 | 68,597 | 81.4% | 36.8% |
| 2015 | 468,994 | 246,493 | 104,376 | 33,408 | 90.3% | 33.7% | 24.1% | 391,438 | 213,287 | 72,993 | 83.5% | 36.7% |
| 2016 | 483,997 | 250,138 | 109,939 | 35,948 | 93.5% | 34.4% | 24.4% | 404,868 | 216,628 | 77,859 | 86.9% | 37.5% |
| 2017 | 516,076 | 268,136 | 115,703 | 37,938 | 92.5% | 34.5% | 24.6% | 433,617 | 232,640 | 82,471 | 86.4% | 37.6% |
| 2018 | 554,547 | 287,970 | 122,805 | 39,843 | 92.6% | 35.0% | 25.3% | 467,005 | 249,413 | 88,048 | 87.2% | 38.4% |
| 2019 | 589,855 | 308,969 | 130,353 | 42,628 | 90.9% | 34.3% | 24.6% | 499,563 | 269,356 | 93,547 | 85.5% | 37.7% |
| 2020 |         |         | 138,142 | 45,594 |       |       |       |         |         |        |       |       |

Sources for Table 2:

Column (1) Series SNEA.SG01NAC00P10 from Infoshare table SNE038AA at May 2021.  
Column (2) Series SNEA.SG01NAC00P20 from Infoshare table SNE038AA at May 2021.  
Column (3) Series SNEA.SG03NAC00D10 from Infoshare table SNE087AA at May 2021.  
Column (4) Series SNEA.SG05NAC00K10 from Infoshare table SNE105AA at May 2021.  
Column (8) Series SNEA.SG01NAC01P10M1 from Infoshare table SNE041AA at May 2021.  
Column (9) Series SNEA.SG01NAC01P20M1 from Infoshare table SNE041AA at May 2021.  
Column (10) Series SNEA.SG03NAC01B02M4 from Infoshare table SNE088AA at May 2021.  
Columns (5), (6), (7), (11) and (12) calculated as shown.

**Table 3: Calculating a warranted rate of return on net capital stock**

|      | Calculation of WACC           |                   |                               |                          |                           |                                |               |      | Calculation of warranted rate of return |                              |                      |                                 |
|------|-------------------------------|-------------------|-------------------------------|--------------------------|---------------------------|--------------------------------|---------------|------|-----------------------------------------|------------------------------|----------------------|---------------------------------|
|      | (1)                           | (2)               | (3)                           | (4)                      | (5)                       | (6)                            | (7)           | (8)  | (9)                                     | (10)                         | (11)                 | (12)                            |
|      | Risk-free interest rate $R_f$ | Debt Risk Premium | Cost of debt, $i^D_{(1)+(2)}$ | Market Risk Premium, MRP | Corporate tax rate $\tau$ | Cost of equity $i^E_{(1)+(4)}$ | Leverage, $L$ | WACC | Average depreciation rate $\delta$      | Capital goods inflation rate | $(1-z\tau)/(1-\tau)$ | Required pre-tax rate of return |
| 1939 | 4.24%                         | 1.00%             | 5.24%                         | 5.70%                    | 57.5%                     | 9.94%                          | 40%           | 6.9% | 2.66%                                   | 3.65%                        | 1.09                 | 6.37%                           |
| 1940 | 3.61%                         | 1.00%             | 4.61%                         | 5.70%                    | 68.8%                     | 9.31%                          | 40%           | 6.2% | 2.72%                                   | 3.85%                        | 1.08                 | 5.45%                           |
| 1941 | 3.37%                         | 1.00%             | 4.37%                         | 5.70%                    | 71.3%                     | 9.07%                          | 40%           | 5.9% | 2.64%                                   | 3.69%                        | 1.14                 | 5.57%                           |
| 1942 | 3.20%                         | 1.00%             | 4.20%                         | 5.70%                    | 89.2%                     | 8.90%                          | 40%           | 5.5% | 2.58%                                   | 3.50%                        | 1.12                 | 5.16%                           |
| 1943 | 3.18%                         | 1.00%             | 4.18%                         | 5.70%                    | 89.2%                     | 8.88%                          | 40%           | 5.5% | 2.67%                                   | 2.68%                        | 1.13                 | 6.20%                           |
| 1944 | 3.15%                         | 1.00%             | 4.15%                         | 5.70%                    | 89.2%                     | 8.85%                          | 40%           | 5.5% | 2.76%                                   | 2.50%                        | 1.14                 | 6.53%                           |
| 1945 | 3.19%                         | 1.00%             | 4.19%                         | 5.70%                    | 89.2%                     | 8.89%                          | 40%           | 5.5% | 2.87%                                   | 1.49%                        | 1.14                 | 7.87%                           |
| 1946 | 3.01%                         | 1.00%             | 4.01%                         | 5.70%                    | 68.3%                     | 8.71%                          | 40%           | 5.7% | 2.93%                                   | 1.01%                        | 1.15                 | 8.82%                           |
| 1947 | 3.00%                         | 1.00%             | 4.00%                         | 5.70%                    | 65.8%                     | 8.70%                          | 40%           | 5.8% | 3.35%                                   | 3.80%                        | 1.15                 | 6.13%                           |
| 1948 | 3.03%                         | 1.00%             | 4.03%                         | 5.70%                    | 65.9%                     | 8.73%                          | 40%           | 5.8% | 3.59%                                   | 4.17%                        | 1.17                 | 6.08%                           |
| 1949 | 3.07%                         | 1.00%             | 4.07%                         | 5.70%                    | 65.9%                     | 8.77%                          | 40%           | 5.8% | 3.75%                                   | 4.73%                        | 1.28                 | 6.20%                           |
| 1950 | 3.07%                         | 1.00%             | 4.07%                         | 5.70%                    | 65.9%                     | 8.77%                          | 40%           | 5.8% | 4.68%                                   | 4.59%                        | 1.24                 | 7.33%                           |
| 1951 | 3.08%                         | 1.00%             | 4.08%                         | 5.70%                    | 60.8%                     | 8.78%                          | 40%           | 5.9% | 4.68%                                   | 8.21%                        | 1.24                 | 2.95%                           |
| 1952 | 3.85%                         | 1.00%             | 4.85%                         | 5.70%                    | 55.8%                     | 9.55%                          | 40%           | 6.6% | 4.68%                                   | 9.61%                        | 1.24                 | 2.05%                           |
| 1953 | 4.03%                         | 0.95%             | 4.98%                         | 5.70%                    | 53.3%                     | 9.73%                          | 40%           | 6.8% | 4.68%                                   | 8.00%                        | 1.22                 | 4.19%                           |
| 1954 | 3.97%                         | 1.11%             | 5.08%                         | 5.70%                    | 50.8%                     | 9.67%                          | 40%           | 6.8% | 4.68%                                   | 5.27%                        | 1.22                 | 7.60%                           |
| 1955 | 4.15%                         | 0.71%             | 4.86%                         | 5.70%                    | 50.8%                     | 9.85%                          | 40%           | 6.9% | 4.68%                                   | 4.39%                        | 1.22                 | 8.71%                           |
| 1956 | 4.65%                         | 0.70%             | 5.35%                         | 5.70%                    | 50.8%                     | 10.35%                         | 40%           | 7.3% | 4.68%                                   | 3.45%                        | 1.21                 | 10.32%                          |
| 1957 | 4.81%                         | 1.07%             | 5.88%                         | 5.70%                    | 50.8%                     | 10.51%                         | 40%           | 7.5% | 4.68%                                   | 2.79%                        | 1.23                 | 11.46%                          |
| 1958 | 4.95%                         | 1.41%             | 6.36%                         | 5.70%                    | 50.1%                     | 10.65%                         | 40%           | 7.7% | 4.68%                                   | 2.59%                        | 1.20                 | 11.72%                          |
| 1959 | 4.85%                         | 0.72%             | 5.57%                         | 5.70%                    | 50.1%                     | 10.55%                         | 40%           | 7.4% | 4.68%                                   | 1.83%                        | 1.19                 | 12.25%                          |
| 1960 | 4.83%                         | 1.07%             | 5.90%                         | 5.70%                    | 50.1%                     | 10.53%                         | 40%           | 7.5% | 4.68%                                   | 1.59%                        | 1.20                 | 12.72%                          |
| 1961 | 5.08%                         | 1.19%             | 6.27%                         | 5.70%                    | 50.1%                     | 10.78%                         | 40%           | 7.7% | 4.68%                                   | 1.31%                        | 1.21                 | 13.41%                          |
| 1962 | 5.25%                         | 1.07%             | 6.32%                         | 5.70%                    | 50.1%                     | 10.95%                         | 40%           | 7.8% | 4.68%                                   | 1.85%                        | 1.20                 | 12.76%                          |
| 1963 | 5.15%                         | 0.85%             | 6.00%                         | 5.70%                    | 50.1%                     | 10.85%                         | 40%           | 7.7% | 4.66%                                   | 1.59%                        | 1.19                 | 12.86%                          |
| 1964 | 5.06%                         | 0.64%             | 5.70%                         | 5.70%                    | 50.1%                     | 10.76%                         | 40%           | 7.6% | 4.64%                                   | 2.45%                        | 1.20                 | 11.77%                          |
| 1965 | 5.10%                         | 0.58%             | 5.68%                         | 5.70%                    | 50.1%                     | 10.80%                         | 40%           | 7.6% | 4.60%                                   | 3.03%                        | 1.20                 | 11.01%                          |
| 1966 | 5.28%                         | 0.74%             | 6.02%                         | 5.70%                    | 50.1%                     | 10.98%                         | 40%           | 7.8% | 4.56%                                   | 3.52%                        | 1.19                 | 10.53%                          |
| 1967 | 5.50%                         | 1.16%             | 6.66%                         | 5.70%                    | 50.1%                     | 11.20%                         | 40%           | 8.1% | 4.26%                                   | 3.22%                        | 1.20                 | 10.93%                          |
| 1968 | 5.53%                         | 1.29%             | 6.82%                         | 5.70%                    | 50.0%                     | 11.23%                         | 40%           | 8.1% | 4.33%                                   | 4.59%                        | 1.19                 | 9.36%                           |

|      |        |       |        |       |       |        |     |       |       |        |      |        |
|------|--------|-------|--------|-------|-------|--------|-----|-------|-------|--------|------|--------|
| 1969 | 5.54%  | 1.14% | 6.68%  | 5.70% | 50.0% | 11.24% | 40% | 8.1%  | 4.14% | 5.55%  | 1.16 | 7.75%  |
| 1970 | 5.51%  | 1.76% | 7.27%  | 5.70% | 50.0% | 11.21% | 40% | 8.2%  | 4.14% | 9.14%  | 1.16 | 3.67%  |
| 1971 | 5.52%  | 2.40% | 7.92%  | 5.70% | 50.0% | 11.22% | 40% | 8.3%  | 4.46% | 10.90% | 1.20 | 2.24%  |
| 1972 | 5.52%  | 1.95% | 7.47%  | 5.70% | 50.0% | 11.22% | 40% | 8.2%  | 5.86% | 11.26% | 1.13 | 3.19%  |
| 1973 | 5.80%  | 1.40% | 7.20%  | 5.70% | 45.0% | 11.50% | 40% | 8.5%  | 5.95% | 9.81%  | 1.11 | 5.12%  |
| 1974 | 6.08%  | 1.94% | 8.02%  | 5.70% | 45.0% | 11.78% | 40% | 8.8%  | 5.91% | 12.78% | 1.12 | 2.20%  |
| 1975 | 6.33%  | 2.62% | 8.95%  | 5.70% | 45.0% | 12.03% | 40% | 9.2%  | 5.74% | 17.86% | 1.14 | -3.35% |
| 1976 | 8.34%  | 2.14% | 10.48% | 5.70% | 45.0% | 14.04% | 40% | 10.7% | 6.31% | 20.10% | 1.15 | -3.51% |
| 1977 | 9.25%  | 1.55% | 10.80% | 5.70% | 45.0% | 14.95% | 40% | 11.3% | 6.35% | 17.80% | 1.12 | -0.13% |
| 1978 | 9.98%  | 1.08% | 11.06% | 5.70% | 45.0% | 15.68% | 40% | 11.8% | 6.56% | 15.62% | 1.08 | 3.01%  |
| 1979 | 12.03% | 1.25% | 13.28% | 5.70% | 45.0% | 17.73% | 40% | 13.6% | 6.30% | 15.06% | 1.06 | 5.09%  |
| 1980 | 13.28% | 2.21% | 15.49% | 5.70% | 45.0% | 18.98% | 40% | 14.8% | 6.37% | 15.81% | 1.09 | 5.83%  |
| 1981 | 12.83% | 2.13% | 14.96% | 5.70% | 45.0% | 18.53% | 40% | 14.4% | 6.06% | 16.24% | 1.07 | 4.52%  |
| 1982 | 12.89% | 3.11% | 16.00% | 5.70% | 45.0% | 18.59% | 40% | 14.7% | 6.03% | 13.79% | 1.06 | 7.33%  |
| 1983 | 12.17% | 2.45% | 14.62% | 5.70% | 45.0% | 17.87% | 40% | 13.9% | 6.30% | 9.91%  | 1.06 | 10.96% |
| 1984 | 12.56% | 1.75% | 14.31% | 5.70% | 45.0% | 18.26% | 40% | 14.1% | 6.19% | 7.73%  | 1.04 | 13.06% |
| 1985 | 17.67% | 2.09% | 19.76% | 5.70% | 46.5% | 23.37% | 40% | 18.2% | 6.19% | 9.46%  | 1.06 | 15.94% |
| 1986 | 17.86% | 2.71% | 20.57% | 5.70% | 48.0% | 23.56% | 40% | 18.4% | 6.31% | 11.21% | 1.07 | 14.41% |
| 1987 | 16.02% | 2.19% | 18.21% | 5.70% | 38.0% | 21.72% | 40% | 17.5% | 6.47% | 9.67%  | 1.05 | 15.07% |
| 1988 | 15.01% | 1.98% | 16.99% | 5.70% | 28.0% | 20.71% | 40% | 17.3% | 6.35% | 6.57%  | 1.09 | 18.61% |
| 1989 | 13.02% | 1.68% | 14.70% | 5.70% | 30.5% | 18.72% | 40% | 15.3% | 6.20% | 4.34%  | 1.07 | 18.39% |
| 1990 | 12.57% | 1.81% | 14.38% | 5.70% | 33.0% | 18.27% | 40% | 14.8% | 6.22% | 3.14%  | 1.09 | 19.55% |
| 1991 | 12.31% | 1.94% | 14.25% | 5.70% | 33.0% | 18.01% | 40% | 14.6% | 6.45% | 2.08%  | 1.06 | 20.04% |
| 1992 | 9.48%  | 1.97% | 11.45% | 5.70% | 33.0% | 15.18% | 40% | 12.2% | 6.67% | 1.36%  | 1.05 | 18.42% |
| 1993 | 8.05%  | 2.06% | 10.11% | 5.70% | 33.0% | 13.75% | 40% | 11.0% | 6.85% | 1.88%  | 1.05 | 16.74% |
| 1994 | 6.49%  | 1.54% | 8.03%  | 5.70% | 33.0% | 12.19% | 40% | 9.5%  | 6.80% | 2.96%  | 1.07 | 14.20% |
| 1995 | 8.28%  | 1.62% | 9.90%  | 5.70% | 33.0% | 13.98% | 40% | 11.0% | 6.68% | 3.38%  | 1.09 | 15.60% |
| 1996 | 7.49%  | 1.62% | 9.11%  | 5.70% | 33.0% | 13.19% | 40% | 10.4% | 6.67% | 2.58%  | 1.09 | 15.80% |
| 1997 | 7.92%  | 1.51% | 9.43%  | 5.70% | 33.0% | 13.62% | 40% | 10.7% | 6.78% | 1.45%  | 1.08 | 17.28% |
| 1998 | 7.03%  | 1.96% | 8.99%  | 5.70% | 33.0% | 12.73% | 40% | 10.0% | 6.75% | 0.68%  | 1.09 | 17.50% |
| 1999 | 6.00%  | 2.23% | 8.23%  | 5.70% | 33.0% | 11.70% | 40% | 9.2%  | 6.86% | 0.86%  | 1.07 | 16.29% |
| 2000 | 6.82%  | 2.34% | 9.16%  | 5.70% | 33.0% | 12.52% | 40% | 10.0% | 6.75% | 1.62%  | 1.08 | 16.25% |
| 2001 | 6.54%  | 2.93% | 9.47%  | 5.70% | 33.0% | 12.24% | 40% | 9.9%  | 6.96% | 1.93%  | 1.08 | 16.07% |
| 2002 | 6.56%  | 3.19% | 9.75%  | 5.70% | 33.0% | 12.26% | 40% | 10.0% | 7.11% | 2.27%  | 1.07 | 15.83% |
| 2003 | 6.35%  | 2.75% | 9.10%  | 5.70% | 33.0% | 12.05% | 40% | 9.7%  | 6.92% | 3.16%  | 1.07 | 14.40% |
| 2004 | 5.84%  | 2.12% | 7.96%  | 5.70% | 33.0% | 11.54% | 40% | 9.1%  | 6.64% | 4.51%  | 1.09 | 12.15% |
| 2005 | 6.11%  | 1.08% | 7.19%  | 5.70% | 33.0% | 11.81% | 40% | 9.0%  | 6.51% | 5.23%  | 1.10 | 11.29% |
| 2006 | 5.80%  | 1.17% | 6.97%  | 5.70% | 33.0% | 11.50% | 40% | 8.8%  | 6.39% | 4.69%  | 1.11 | 11.60% |
| 2007 | 5.83%  | 1.55% | 7.38%  | 5.70% | 33.0% | 11.53% | 40% | 8.9%  | 6.54% | 4.03%  | 1.12 | 12.74% |

|      |       |       |        |       |       |        |     |      |       |       |      |        |
|------|-------|-------|--------|-------|-------|--------|-----|------|-------|-------|------|--------|
| 2008 | 5.64% | 4.21% | 9.85%  | 5.70% | 30.0% | 11.34% | 40% | 9.6% | 6.39% | 3.23% | 1.12 | 14.24% |
| 2009 | 5.64% | 4.49% | 10.13% | 5.70% | 30.0% | 11.34% | 40% | 9.6% | 6.66% | 2.04% | 1.11 | 15.86% |
| 2010 | 5.78% | 2.41% | 8.19%  | 5.70% | 30.0% | 11.48% | 40% | 9.2% | 6.89% | 1.17% | 1.07 | 15.95% |
| 2011 | 5.52% | 2.89% | 8.41%  | 5.70% | 28.0% | 11.22% | 40% | 9.2% | 6.77% | 0.96% | 1.07 | 16.05% |
| 2012 | 4.55% | 3.56% | 8.11%  | 5.70% | 28.0% | 10.25% | 40% | 8.5% | 6.57% | 1.53% | 1.09 | 14.68% |
| 2013 | 3.61% | 3.07% | 6.68%  | 5.70% | 28.0% | 9.31%  | 40% | 7.5% | 6.46% | 2.15% | 1.08 | 12.82% |
| 2014 | 4.32% | 2.19% | 6.51%  | 5.70% | 28.0% | 10.02% | 40% | 7.9% | 6.35% | 2.72% | 1.09 | 12.49% |
| 2015 | 3.99% | 2.30% | 6.29%  | 5.70% | 28.0% | 9.69%  | 40% | 7.6% | 6.22% | 3.32% | 1.09 | 11.43% |
| 2016 | 3.37% | 2.49% | 5.86%  | 5.70% | 28.0% | 9.07%  | 40% | 7.1% | 6.30% | 3.65% | 1.08 | 10.62% |
| 2017 | 2.80% | 1.77% | 4.57%  | 5.70% | 28.0% | 8.50%  | 40% | 6.4% | 6.29% | 3.69% | 1.09 | 9.81%  |
| 2018 | 2.90% | 1.84% | 4.74%  | 5.70% | 28.0% | 8.60%  | 40% | 6.5% | 6.19% | 3.54% | 1.09 | 9.97%  |
| 2019 | 2.57% | 2.04% | 4.61%  | 5.70% | 28.0% | 8.27%  | 40% | 6.3% | 6.18% | 3.45% | 1.09 | 9.86%  |
| 2020 | 1.43% | 2.05% | 3.48%  | 5.70% | 28.0% | 7.13%  | 40% | 5.3% |       |       |      |        |

### Sources for Table 3:

- Column (1) Risk-free interest rate = 10-year Government bond rate  
 1939-1985 average over each calendar year, from Lally and Marsden 2004, data kindly supplied by Martin Lally.  
 1986-2020 average over year to March, calculated from RBNZ Table B2 Monthly, <https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Statistics/tables/b2/hb2-monthly.xlsx?revision=489141ce-2932-4bf1-883d-87be5dba1e8f> downloaded May 2021.
- Column (2) Debt Risk Premium: data supplied by Martin Lally  
 The DRP is the margin of the BBB corporate bond yield over the risk-free rate  $R_f$ .  
 Data for 2005 – 2020 is monthly Australian data, from column AJ of Table F3 on the RBA's website: <https://www.rba.gov.au/statistics/tables/#interest-rates>.  
 For 1953 – 2004, the DRP is drawn from monthly US FRED data (Moody's Seasoned Baa corporate bond yield – Ten Year Treasury Constant Maturity Rate: <https://fred.stlouisfed.org/searchresults/?st=interest%20rate&t=monthly&ob=sr&od=desc&types=ge> n).  
 For 1939 – 1952, the annual figure of 1% is used consistent with 1950s data.  
 Note from Lally 6 May 2021: "In respect of the use of BBB data on the DRP, Craigs Daily Rate Sheet for 4 May 2021 ([www.craigsip.com](http://www.craigsip.com)) provides credit ratings on NZ companies whose bonds are publicly traded. Of the 18 companies there for which ratings exist, they range from AA- to BBB. However, this is an upwardly biased sample because the numerous companies listed there that are not rated can be presumed to warrant inferior ratings if they were rated and because of this do not seek a rating (and ratings are only conducted when the firm pays for them). Thus, BBB is a reasonable estimate of the average credit rating of NZ companies."
- Column (3) calculated as the sum of risk-free rate  $R_f$  and the Debt Risk Premium, Columns (1) and (2)
- Column (4) Market Risk Premium:  
 The MRP is estimated at 5.7% per year by historical averaging of returns data from 1900 – 2020 presented in Table 49 (page 165) of Credit Suisse *Global Investment Returns Yearbook 2020: Arithmetic Mean for Equities of 11.9% - Arithmetic Mean for Bonds of 6.2%*. Data provided by Martin Lally.
- Column (5) corporate tax rate:  
 1980-2020 <https://tradingeconomics.com/new-zealand/corporate-tax-rate> accessed 9 May 2021  
 1969-1979 from section 26B in *New Zealand Official Yearbook* issues from 1970 to 1979.  
 1939-1968 from Ross *et al* 1967 Appendix 1, pp.456-475.
- Column (6) Cost of equity  $i^E$  is calculated as  $i^E = R_f + \beta \cdot MRP$  (with  $\beta=1$  since the analysis is for the economy as a whole)
- Column (7) Leverage: assumed 40%. Lally (*pers.comm.* April 2021) advises that "Since the MRP is a long-run estimate, and the true MRP will fluctuate with market leverage, consistency requires a long-run estimate of market leverage. This is 40%, averaged over 1960 – 2005 data, and taken from Table 3.3 of Bao, D., 2008. "Time-Varying Market Leverage and the Market Risk Premium in New Zealand", Masters Thesis, Victoria University of Wellington (<http://researcharchive.vuw.ac.nz/xmlui/bitstream/handle/10063/490/thesis.pdf?sequence=1>)."
- Column (8) Weighted Average Cost of Capital (WACC): calculated using the formula  $WACC = i^D L (1-\tau) + i^E (1-L)$  where  $L$  is the leverage ratio.
- Column (9) average depreciation rate:  
 1972-2020 is the ratio of "Consumption of Fixed Capital" to "Net Capital Stock" for the economy excluding identifiable predominantly non-market sectors. Depreciation is calculated as series SNEA.SG05NAC04K10ZZ9 (total consumption of fixed capital) from Infoshare table SNE106AA minus the sum of series SNEA.SG05NAC05K10LL21 (Owner Occupied Property), SNEA.SG05NAC05K10OO11 (Local Government Administration), SNEA.SG05NAC05K10OO21 (Central Government Administration, Defence and Public Safety), SNEA.SG05NAC05K10PP11 (Education and Training), and SNEA.SG05NAC05K10QQ11 (Health and Social Assistance), all from Infoshare table SNE107AA. Data downloaded April 2021. Net capital stock is series SNEA.SG07NAC05K90ZZ99 (Total all industries) minus SNEA.SG07NAC05K90LL21 (Owner-occupied Property), SNEA.SG07NAC05K90OO11 (Local Government Administration), SNEA.SG07NAC05K90OO21 (Central Government Administration,

Defence and Public Safety), SNEA.SG07NAC05K90PP11 (Education and Training) and SNEA.SG07NAC05K90QQ11 (Health Care and Social Assistance), all from Infoshare table SNE060AA. 1939-1971 is series Series ONAA.SAL (Total depreciation) from Infoshare table ONA001AA , divided by our estimate of the net capital stock in Table 4 below.

Column (10) Capital Goods Inflation rate is a three-year rolling average of the following series:

1973-2020 is the annual increase in a capital-goods price index calculated from net nominal capital stock SNEA.SG07NAC00K90 (Infoshare table SNE054AA) and net constant-price capital stock SNEA.SG07RAC00K90 (Infoshare table SNE064AA).

1951-1972 is the annual increase in a weighted average of the capital price indices for “Building & construction” and “Plant and equipment” in B.P. Philpott, *New Zealand Real Gross Capital Formation in 22 SNA Sectors*, RPEP Occasional Paper 104, August 1992, p.8.

1939-1950 we use the March-to-March increase in the Consumer Price Index series CPIQ.SE9A from Infoshare table CPI009AA.

Column (11), the  $\frac{1-z\tau}{1-\tau}$  term in Barkai’s equation 2 reproduced earlier, is calculated using the corporate tax rate from column (5) and  $z$  calculated using the formula from Hall and Jorgenson 1967 p.394:

$$z = \frac{1}{rT}(1 - e^{-rT})$$

where  $T$  is the asset life and  $r$  is the discount rate. In this version of the calculation the discount rate used is the WACC.

Column (12) is calculated as the sum of Columns (8) and (9), minus Column (10), all multiplied by Column (11).

**Table 4: Cost of capital calculations**

|      | Calculating cost of capital                                                   |                          |                     |                                                              |                   |                  |                                                  |                                |                                  |                                |
|------|-------------------------------------------------------------------------------|--------------------------|---------------------|--------------------------------------------------------------|-------------------|------------------|--------------------------------------------------|--------------------------------|----------------------------------|--------------------------------|
|      | (1)                                                                           | (2)                      | (3)                 | (4)                                                          | (5)               | (6)              | (7)                                              | (8)                            | (9)                              | (10)                           |
|      | Net capital stock excl residential buildings and non-market-Govt estimate P*K | Warranted rate of return | Cost of capital \$m | Gross domestic operating surplus of market sectors (est) \$m | Rent estimate \$m | Rent as % of NDI | Rent as % of operating surplus of market sectors | Consumer Price Index 2017=1000 | Real cost of capital in 2017 \$m | Real gross surplus in 2017 \$m |
| 1939 | 1,278                                                                         | 6.4%                     | 81                  | 146                                                          | 64                | 17%              | 44%                                              | 20                             | 4,058                            | 7,273                          |
| 1940 | 1,323                                                                         | 5.5%                     | 72                  | 177                                                          | 104               | 25%              | 59%                                              | 21                             | 3,441                            | 8,420                          |
| 1941 | 1,361                                                                         | 5.6%                     | 76                  | 172                                                          | 96                | 21%              | 56%                                              | 22                             | 3,471                            | 7,862                          |
| 1942 | 1,395                                                                         | 5.2%                     | 72                  | 188                                                          | 116               | 23%              | 62%                                              | 22                             | 3,223                            | 8,403                          |
| 1943 | 1,424                                                                         | 6.2%                     | 88                  | 205                                                          | 117               | 20%              | 57%                                              | 23                             | 3,800                            | 8,827                          |
| 1944 | 1,447                                                                         | 6.5%                     | 94                  | 218                                                          | 124               | 19%              | 57%                                              | 24                             | 3,991                            | 9,226                          |
| 1945 | 1,463                                                                         | 7.9%                     | 115                 | 224                                                          | 109               | 17%              | 49%                                              | 24                             | 4,784                            | 9,307                          |
| 1946 | 1,502                                                                         | 8.8%                     | 132                 | 228                                                          | 96                | 14%              | 42%                                              | 24                             | 5,451                            | 9,396                          |
| 1947 | 1,554                                                                         | 6.1%                     | 95                  | 252                                                          | 157               | 22%              | 62%                                              | 24                             | 3,907                            | 10,329                         |
| 1948 | 1,613                                                                         | 6.1%                     | 98                  | 275                                                          | 177               | 22%              | 64%                                              | 27                             | 3,652                            | 10,257                         |
| 1949 | 1,707                                                                         | 6.2%                     | 106                 | 252                                                          | 146               | 18%              | 58%                                              | 27                             | 3,858                            | 9,192                          |
| 1950 | 1,496                                                                         | 7.3%                     | 110                 | 285                                                          | 175               | 19%              | 62%                                              | 28                             | 3,921                            | 10,188                         |
| 1951 | 1,667                                                                         | 3.0%                     | 49                  | 378                                                          | 329               | 28%              | 87%                                              | 31                             | 1,601                            | 12,316                         |
| 1952 | 1,838                                                                         | 2.0%                     | 38                  | 383                                                          | 346               | 29%              | 90%                                              | 34                             | 1,096                            | 11,166                         |
| 1953 | 2,051                                                                         | 4.2%                     | 86                  | 387                                                          | 301               | 24%              | 78%                                              | 36                             | 2,399                            | 10,794                         |
| 1954 | 2,265                                                                         | 7.6%                     | 172                 | 443                                                          | 271               | 19%              | 61%                                              | 38                             | 4,560                            | 11,732                         |
| 1955 | 2,607                                                                         | 8.7%                     | 227                 | 492                                                          | 264               | 17%              | 54%                                              | 39                             | 5,845                            | 12,649                         |
| 1956 | 2,821                                                                         | 10.3%                    | 291                 | 490                                                          | 199               | 12%              | 41%                                              | 40                             | 7,330                            | 12,353                         |
| 1957 | 3,120                                                                         | 11.5%                    | 358                 | 513                                                          | 155               | 9%               | 30%                                              | 41                             | 8,767                            | 12,562                         |
| 1958 | 3,376                                                                         | 11.7%                    | 396                 | 566                                                          | 171               | 9%               | 30%                                              | 42                             | 9,442                            | 13,519                         |
| 1959 | 3,547                                                                         | 12.3%                    | 435                 | 599                                                          | 165               | 9%               | 27%                                              | 45                             | 9,736                            | 13,427                         |
| 1960 | 3,590                                                                         | 12.7%                    | 457                 | 640                                                          | 183               | 9%               | 29%                                              | 45                             | 10,178                           | 14,262                         |
| 1961 | 3,932                                                                         | 13.4%                    | 527                 | 745                                                          | 218               | 10%              | 29%                                              | 46                             | 11,570                           | 16,353                         |
| 1962 | 4,359                                                                         | 12.8%                    | 556                 | 927                                                          | 371               | 16%              | 40%                                              | 47                             | 11,855                           | 19,770                         |
| 1963 | 4,699                                                                         | 12.9%                    | 604                 | 1,047                                                        | 443               | 18%              | 42%                                              | 48                             | 12,643                           | 21,915                         |
| 1964 | 5,001                                                                         | 11.8%                    | 588                 | 1,150                                                        | 561               | 21%              | 49%                                              | 49                             | 12,011                           | 23,468                         |
| 1965 | 5,416                                                                         | 11.0%                    | 596                 | 1,271                                                        | 675               | 23%              | 53%                                              | 51                             | 11,667                           | 24,871                         |
| 1966 | 5,982                                                                         | 10.5%                    | 630                 | 1,380                                                        | 750               | 23%              | 54%                                              | 53                             | 11,989                           | 26,253                         |
| 1967 | 7,039                                                                         | 10.9%                    | 769                 | 1,428                                                        | 659               | 20%              | 46%                                              | 55                             | 14,040                           | 26,070                         |
| 1968 | 7,360                                                                         | 9.4%                     | 689                 | 1,495                                                        | 806               | 23%              | 54%                                              | 58                             | 11,973                           | 25,989                         |
| 1969 | 8,039                                                                         | 7.8%                     | 623                 | 1,616                                                        | 992               | 27%              | 61%                                              | 61                             | 10,273                           | 26,635                         |
| 1970 | 8,794                                                                         | 3.7%                     | 323                 | 1,807                                                        | 1,484             | 37%              | 82%                                              | 64                             | 5,083                            | 28,437                         |
| 1971 | 9,869                                                                         | 2.2%                     | 222                 | 1,883                                                        | 1,661             | 36%              | 88%                                              | 70                             | 3,160                            | 26,860                         |
| 1972 | 11,289                                                                        | 3.2%                     | 360                 | 1,875                                                        | 1,515             | 27%              | 81%                                              | 76                             | 4,731                            | 24,659                         |
| 1973 | 12,777                                                                        | 5.1%                     | 654                 | 2,172                                                        | 1,518             | 24%              | 70%                                              | 81                             | 8,123                            | 26,960                         |
| 1974 | 14,970                                                                        | 2.2%                     | 330                 | 2,603                                                        | 2,274             | 30%              | 87%                                              | 89                             | 3,708                            | 29,295                         |
| 1975 | 19,279                                                                        | -3.4%                    | -646                | 2,629                                                        | 3,275             | 40%              | 125%                                             | 101                            | -6,421                           | 26,130                         |
| 1976 | 24,493                                                                        | -3.5%                    | -860                | 2,434                                                        | 3,294             | 37%              | 135%                                             | 118                            | -7,295                           | 20,647                         |
| 1977 | 29,422                                                                        | -0.1%                    | -37                 | 3,504                                                        | 3,541             | 33%              | 101%                                             | 134                            | -279                             | 26,150                         |
| 1978 | 34,129                                                                        | 3.0%                     | 1,028               | 3,866                                                        | 2,838             | 24%              | 73%                                              | 154                            | 6,693                            | 25,173                         |
| 1979 | 39,777                                                                        | 5.1%                     | 2,026               | 4,336                                                        | 2,311             | 17%              | 53%                                              | 170                            | 11,947                           | 25,575                         |
| 1980 | 45,922                                                                        | 5.8%                     | 2,679               | 4,765                                                        | 2,086             | 13%              | 44%                                              | 201                            | 13,347                           | 23,740                         |
| 1981 | 53,788                                                                        | 4.5%                     | 2,431               | 5,594                                                        | 3,163             | 17%              | 57%                                              | 231                            | 10,510                           | 24,184                         |
| 1982 | 63,991                                                                        | 7.3%                     | 4,693               | 7,181                                                        | 2,488             | 11%              | 35%                                              | 268                            | 17,518                           | 26,806                         |
| 1983 | 70,865                                                                        | 11.0%                    | 7,767               | 8,765                                                        | 998               | 4%               | 11%                                              | 302                            | 25,739                           | 29,048                         |
| 1984 | 76,863                                                                        | 13.1%                    | 10,039              | 11,274                                                       | 1,235             | 4%               | 11%                                              | 312                            | 32,151                           | 36,106                         |

|      |         |       |        |        |        |      |      |      |        |        |
|------|---------|-------|--------|--------|--------|------|------|------|--------|--------|
| 1985 | 87,544  | 15.9% | 13,950 | 12,697 | -1,253 | -4%  | -10% | 354  | 39,397 | 35,858 |
| 1986 | 101,847 | 14.4% | 14,678 | 13,827 | -851   | -2%  | -6%  | 400  | 36,698 | 34,570 |
| 1987 | 114,150 | 15.1% | 17,201 | 16,586 | -616   | -1%  | -4%  | 473  | 36,355 | 35,053 |
| 1988 | 123,562 | 18.6% | 22,997 | 16,461 | -6,536 | -14% | -40% | 516  | 44,599 | 31,924 |
| 1989 | 131,384 | 18.4% | 24,167 | 18,288 | -5,880 | -12% | -32% | 536  | 45,058 | 34,096 |
| 1990 | 139,248 | 19.5% | 27,220 | 18,923 | -8,297 | -16% | -44% | 574  | 47,420 | 32,966 |
| 1991 | 144,028 | 20.0% | 28,861 | 20,127 | -8,735 | -16% | -43% | 600  | 48,101 | 33,544 |
| 1992 | 144,805 | 18.4% | 26,676 | 19,536 | -7,140 | -13% | -37% | 605  | 44,108 | 32,302 |
| 1993 | 145,910 | 16.7% | 24,421 | 21,695 | -2,726 | -5%  | -13% | 611  | 39,993 | 35,529 |
| 1994 | 150,690 | 14.2% | 21,397 | 25,148 | 3,751  | 6%   | 15%  | 619  | 34,590 | 40,654 |
| 1995 | 157,761 | 15.6% | 24,610 | 27,435 | 2,825  | 4%   | 10%  | 643  | 38,255 | 42,645 |
| 1996 | 165,090 | 15.8% | 26,092 | 28,661 | 2,569  | 4%   | 9%   | 658  | 39,680 | 43,588 |
| 1997 | 170,033 | 17.3% | 29,385 | 29,826 | 441    | 1%   | 1%   | 669  | 43,903 | 44,562 |
| 1998 | 174,860 | 17.5% | 30,593 | 30,607 | 14     | 0%   | 0%   | 678  | 45,125 | 45,145 |
| 1999 | 178,956 | 16.3% | 29,160 | 30,593 | 1,433  | 2%   | 5%   | 677  | 43,050 | 45,166 |
| 2000 | 186,229 | 16.3% | 30,265 | 34,046 | 3,781  | 5%   | 11%  | 687  | 44,027 | 49,528 |
| 2001 | 196,627 | 16.1% | 31,601 | 37,010 | 5,409  | 6%   | 15%  | 708  | 44,606 | 52,241 |
| 2002 | 203,803 | 15.8% | 32,258 | 40,551 | 8,293  | 9%   | 20%  | 727  | 44,385 | 55,797 |
| 2003 | 213,263 | 14.4% | 30,711 | 42,653 | 11,941 | 12%  | 28%  | 745  | 41,218 | 57,245 |
| 2004 | 230,413 | 12.2% | 28,003 | 44,609 | 16,606 | 15%  | 37%  | 757  | 37,010 | 58,958 |
| 2005 | 249,721 | 11.3% | 28,202 | 47,387 | 19,185 | 17%  | 40%  | 778  | 36,266 | 60,936 |
| 2006 | 271,511 | 11.6% | 31,508 | 48,610 | 17,102 | 14%  | 35%  | 803  | 39,216 | 60,502 |
| 2007 | 289,944 | 12.7% | 36,931 | 48,866 | 11,935 | 9%   | 24%  | 824  | 44,829 | 59,316 |
| 2008 | 311,178 | 14.2% | 44,313 | 52,621 | 8,308  | 6%   | 16%  | 852  | 52,038 | 61,795 |
| 2009 | 328,838 | 15.9% | 52,141 | 53,352 | 1,210  | 1%   | 2%   | 877  | 59,465 | 60,846 |
| 2010 | 335,228 | 16.0% | 53,480 | 56,186 | 2,706  | 2%   | 5%   | 895  | 59,768 | 62,793 |
| 2011 | 339,808 | 16.1% | 54,550 | 57,085 | 2,535  | 2%   | 4%   | 935  | 58,358 | 61,070 |
| 2012 | 352,600 | 14.7% | 51,771 | 59,267 | 7,496  | 5%   | 13%  | 949  | 54,529 | 62,424 |
| 2013 | 365,242 | 12.8% | 46,809 | 60,717 | 13,907 | 9%   | 23%  | 958  | 48,883 | 63,406 |
| 2014 | 381,547 | 12.5% | 47,653 | 66,845 | 19,192 | 11%  | 29%  | 972  | 49,012 | 68,752 |
| 2015 | 403,975 | 11.4% | 46,167 | 70,578 | 24,411 | 14%  | 35%  | 975  | 47,365 | 72,409 |
| 2016 | 428,384 | 10.6% | 45,475 | 73,583 | 28,108 | 15%  | 38%  | 979  | 46,461 | 75,178 |
| 2017 | 452,633 | 9.8%  | 44,416 | 75,879 | 31,463 | 16%  | 41%  | 1000 | 44,416 | 75,879 |
| 2018 | 481,236 | 10.0% | 47,957 | 83,905 | 35,948 | 17%  | 43%  | 1011 | 47,435 | 82,992 |
| 2019 | 517,588 | 9.9%  | 51,028 | 86,800 | 35,771 | 16%  | 41%  | 1026 | 49,735 | 84,600 |

#### Sources for Table 4:

Column (1) Net capital stock excluding identifiable non-market sectors:

1972-2020 is series SNEA.SG07NAC05K90ZZ99 (Total all sectors) minus SNEA.SG07NAC05K90LL21 (Owner-occupied Property), SNEA.SG07NAC05K90OO11 (Local Government Administration), SNEA.SG07NAC05K90OO21 (Central Government Administration, Defence and Public Safety), SNEA.SG07NAC05K90PP11 (Education and Training) and SNEA.SG07NAC05K90QQ11 (Health Care and Social Assistance), all from Infoshare table SNE060AA. This disaggregation does not match well with the Statistics New Zealand classification into “market” versus “non-market” in Infoshare table SNE055AA, but is used here because of the availability on Infoshare of matching breakdowns of operating surplus and consumption of fixed capital (for the latter of which Statistics NZ does not provide a market/non-market breakdown – see Infoshare Table SNE025AA), and because it seems more consistent with the Philpott data for the earlier period.

For 1950-1971 we took the real capital stock series at 1983/84 prices from Philpott (1992b) for the two asset categories “Building and Construction” and “Plant and Equipment”, excluded his two sectors “Ownership of owner-occupied dwellings” and “Government (Central and Local) non-market services”, then converted the data to current prices using the capital-goods deflators for the two asset categories from Philpott (1992a) p.8. The resulting series was then scaled to match the Statistics New Zealand SNEA series used for 1972-2020, so that the trend of the Philpott data was used to extend the SNEA data backwards to 1950.

The earlier period 1946-49 was included in an earlier series for net capital stock at 1953/54 prices in Philpott (1971). We excluded “housing” and “roading and social buildings”, converted the data to nominal

money of the day, and again used the trend of this data to back-fill the series already obtained from 1950 forward.

This left only the seven years 1939-1945 to be estimated by some means. We have back-cast the Philpott-derived figure for 1946 using gross investment series Series ONAA.SAO (GFCF Private) and ONAA.SAP (GFCF Public Authorities) and depreciation series ONA.SAL, all from Infoshare table ONA001AA.

Column (2) is Column (12) of Table 3.

Column (3) is the product of Columns (1) and (2).

Column (4) is Series SNEA.SG03NAC04B02ZZ9 from Infoshare table SNE089AA minus (from the same source) series SNEA.SG03NAC04B02LL2, SNEA.SG03NAC04B02OO1, SNEA.SG03NAC04B02OO2, SNEA.SG03NAC04B02PP1, and SNEA.SG03NAC04B02QQ1, and then further reduced by subtracting our estimate of self-employed labour income from Table 1 Column (11).

Column (5) is Column (4) minus Column (3).

Column (6) is Column (5) divided by NDI from Table 1 Column (6).

Column (7) is Column (5) divided by Column (4).

Column (8) is March-year averages calculated from series CPIQ.SE9A in Infoshare table CPI009AA.

Columns (9) and (10) are Columns (2) and (5) respectively deflated by Column (8).

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