MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

The Evolution of Management Practices in New Zealand

CEU Working Paper 22/03

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New Zealand Government

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These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD), which are carefully managed by Stats NZ. For more information about the IDI and LBD please visit https://www.stats.govt.nz/integrated-data/ .

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

Abstract

This paper examines the evolution of management practices in New Zealand, decomposing the overall change in the prevalence of particular practices between 2005 and 2017 into the portions due to changes in practices within firms and those due to the changing composition of the economy. The analysis draws on four waves of the Business Operations survey (BOS), which provide consistent measures of self-reported management practices among New Zealand firms. Questions cover a range of topics including "strategy, goals and planning", "information and benchmarking", "quality and process", and "employee practices". We first establish the extent to which broad changes in industry composition have affected the overall prevalence of certain practices, then turn to the relative roles of firm entry, firm exit, and within-firm practice change.

The results show that the degree of change in the prevalence of most practices has been relatively limited over the period considered. Where change has occurred, groups of similar practices tended to move in the same direction. Practices associated with employee performance and satisfaction have seen some the largest positive shifts, while several practices associated with external monitoring and benchmarking saw a decline over the period. Although there is substantial variation in the prevalence of specific practices across industries, reflecting differing market conditions and priorities, compositional change at the industry level has been limited and has therefore had a minor role in aggregate practice change. In contrast, firm entry and exit has been a significant contributor to change for many practices, with exiting firms generally raising the aggregate prevalence (through having below average levels of practices) while the role of entering firms differs across practices, in some cases raising and in others lowering the aggregate. Similarly, within-firm practice change among continuing firms has increased the overall prevalence of some practices, such as the use of formal processes for setting goals, but reduced others, notably those associated with monitoring of the external environment and the use of performance pay, which have seen aggregate declines over the period in question.

JEL classification

D22, M11, M12

Keywords

Management practices, New Zealand, Decomposition, Structured Management Practices

Executive summary / Key points

This paper examines the evolution of management practices in New Zealand between 2005 and 2017, decomposing overall change in the prevalence of particular practices into the portions due to changes in the structure of the economy and those due to within-firm or within-industry practice change.

The analysis is influenced by findings in the international literature that a core set of "structured" management practices (SMP) are strongly linked to firm performance outcomes (Bloom et al. 2012; Bloom et al. 2019). Detailed interview-based research undertaken in 2009 indicates that, at that time, New Zealand manufacturing firms sat around the middle of the pack with respect to the quality of their management practices, but that performance in people management was particularly poor (Bloom et al. 2012; Green et al. 2011). As New Zealand has not been included in subsequent waves of this research, one goal of the current paper is to identify the extent to which practices have improved (or deteriorated) since that time. A second goal is to provide an expanded description of current practices, and their change over time, for a broad set of industries.

Longitudinal data on Management Practices is sourced from the Business Operations Survey (BOS), an annual, modular survey administered by StatsNZ Tatauranga Aotearoa. The BOS data is linked to a wider collection of administrative and survey data within Stats NZ's Longitudinal Business Database (LBD) and Integrated Data Infrastructure (IDI) This link enables us to track firms over time, facilitating the decomposition of aggregate changes in the reported prevalence of various practices into the portions coming from changes in prevalence within continuing firms, changes driven by firm births and deaths or by relative employment shares, and changes due to sample composition.

Degree of practice change

The observed change in the aggregate prevalence of most practices observed in the BOS has been quite limited over the period considered. While there are large differences in uptake across different industries and firm sizes, there have only been small changes in the prevalence over time within these groups for most practices.

Direction of practice change

Despite this limited degree of aggregate change, looking across 58 individual practices captured by the Business Operations Survey over the period from 2005 to 2017 shows that there are common trends within related groups of practices.

- Practices related to the setting and communication of goals tend to have increased in prevalence, with firms reporting longer planning horizons and greater attempts to engage employees by promoting a company vision and values, and by communicating regularly about business plans and goals.
- There has also been an increase in the prevalence of various forms of inwardly

focused assessment, with firms taking account of a wider range of factors in assessing their own performance, greater documentation of operating processes and systems, and increased reporting of measures to reduce the firm's environmental impact.

- In contrast, several outwardly focused assessment and scanning practices have weakened over this period, with reductions in the prevalence of scanning for various risks and opportunities, and little to no change in the extent to which firms are systematically benchmarking themselves against others or working with their customers and suppliers to improve quality or processes.
- Substantive changes in aggregate uptake have occurred in the area of employee practices, with noticeable increases in the extent to which firms are assessing both employee performance and employee satisfaction, but reductions in the use of performance-based remuneration practices. Employee participation in training and the adoption of processes to manage health and safety also increased over the period to 2017.
- In contrast, there was a more limited increase in the extent to which firms were monitoring the environment to identify risks and opportunities from technology change, with significant increases observed only among the largest firms and in specific industry groups.
- The largest single change observed over the period was an increase of 11.5 percentage points in the share of firms reporting that they had measures in place to reduce their environmental impact. Much of this change took place between 2005 and 2009.
- New Health and Safety at Work legislation appears to have raised firms' awareness of health and safety issues, with a strong increase in the share of firms reporting that they have processes in place to manage health and safety. Most of the increase occured through rising uptake among small firms, and in industries with relatively low initial levels.

Proximate drivers of practice change

- Despite large cross-industry variation in practices, structural change has played only a minor role in driving aggregate change in managerial practices, as industry composition in New Zealand has been quite stable over the time period considered.
- In contrast, turnover at the firm level – that is, the entry and exit of firms with different levels of uptake – has been a significant part of the observed changes in aggregate practice indices.
- Firm entry and exit has been particularly relevant for practices which have experienced an increase in prevalence over the period, consistent with competitive pressures which favour firms with good practices.
- In contrast, decreasing aggregate prevalence of specific practices has often been driven primarily by continuing firms dropping, or reducing their use of, these

practices. In some cases this may reflect changes in the competitive environment (eg, a reduced need to monitor competitors if market conditions are slack) while in others it appears to reflect conscious choices by firms to move away from specific practices (eg, performance pay).

Exploratory analysis of "Structured Management Practices"

In addition to providing an analysis of the individual practices reported in the Business Operations Survey, the paper also provides some exploratory analysis of "Structured Management Practices", as defined by Bloom et al. (2012), using the BOS data. The differences in the breadth and specificity of the two data sources prevents us from drawing any strong conclusions from this analysis. However, the exploratory results suggest that there have been only very mild increases in the uptake of a package of practices related to those used by Bloom et al. (2012). As such, it seems unlikely that a repeat of the interview-based 2009 study of management practices in New Zealand manufacturing firms documented by Green et al. (2011) would show substantial increases in the prevalence of these practices in the years to 2017.

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1 Motivation

This paper examines the evolution of management practices in New Zealand between 2005 and 2017, decomposing the overall change in the prevalence of particular practices into the portions due to changing practices within firms and those due to the changing composition of the economy. We first establish the extent to which broad changes in industry composition have affected the overall prevalence of certain practices, then turn to the relative roles of firm entry, firm exit, and within-firm practice change. Our ability to make these comparisons is built on the availability of four waves of a consistent, high quality, and nationally representative survey of firm practices collected in Stats NZ's Business Operations Survey (BOS).

Recent international literature shows that a core set of "structured" management practices (SMP) are strongly linked to firm performance outcomes (Bloom et al. 2012; Bloom et al. 2019). These authors use detailed management practices data from the World Management Survey (WMS), an interview-based evaluation tool which defines 18 basic management practices and rates firms' practices based on the responses of plant managers to open questions about the plant's operations. This information is further supported by data from the Management and Organisational Practices Survey (MOPS), a more traditional multi-choice survey instrument developed by the authors in collaboration with the US Census Bureau.[1] Bloom et al. (2012) and Bloom et al. (2019) show that higher levels of SMP are consistently associated with higher productivity, both in the cross section and when comparing the performance of the same firm over time. Moreover, in an experimental study, Bloom et al. (2013) show that intensive management consulting support had a significant impact on the productivity of Indian textile firms, raising productivity by 18 percent on average.[2]

Interview-based research undertaken in 2009 using the World Management Survey tool indicated that, at that time, New Zealand manufacturing firms sat around the middle of the pack with respect to the quality of their management practices, but that performance in people management was poor (Bloom et al. 2012; Green et al. 2011). As New Zealand has not participated in subsequent waves of this research, one goal of the current paper is to identify the extent to which practices have improved (or deteriorated) since that time, and to identify proximate causes for those changes. A second goal is to expand descriptive coverage of management practices in New Zealand to a broader range of industries and a wider set of practices, by using information from the Business Operations Survey (BOS).

The paper reports on the aggregate change between 2005 and 2017 in the prevalence of 58 of the 64 practices which have been captured consistently in the survey across the full

[1] See Bloom et al. (2016) for further detail on the datasets.

[2] McKenzie and Woodruff (2017) show that the positive association between management practices and productivity also holds for micro and small firms, but that there is limited evidence for business training programmes providing a significant boost to performance in these firms (McKenzie and Woodruff 2014). This can be attributed in part to firms failing to implement the practices they have been shown but also reflects the limited statistical power of many evaluations.

period[3] before delving into a more detailed exposition of three selected areas of practice. These are labeled as "planning" – the extent to which firms have formal processes for developing goals, and the length of these planning horizons; "scanning" – the extent to which firms are monitoring the competitive environment; and "manning" – the use of specific human resource practices such as performance reviews and performance pay. Two indicative practices are selected for each area and are used as examples throughout the paper.

Appendix D reports on selected additional practices of particular interest for the Ministry of Business, Innovation and Employment – the uptake of measures to reduce environmental impacts, processes to manage health and safety, and attempts to identify risks and opportunities from technology change. The full set of results for all 56 practices is available in an online data appendix, enabling users to focus on the practices and industries of most interest to them.

The three key areas of practice are similar to the set of Structured Management Practices (SMP) identified by Bloom et al. (2019), which they label as "targets", "monitoring" and "incentives", although the current paper focuses on external, rather than internal, monitoring activities. In this sense, our "scanning" practices more closely resemble the "sensing" capability of Teece, Pisano, and Shuen (1997) and Teece (2019).

The Dynamic Capabilities (DC) framework developed by Teece and co-authors provides an alternative to the Structured Management Practices approach.[4] While SMP considers the practices that drive worker motivation and operational efficiency of current production processes, DC focuses on the firm's ability to identify and respond to a changing business environment. Three central aspects of firms' dynamic capabilities and their "evolutionary fitness" are their ability to "sense" risks and opportunities arising from changing technologies and market conditions, to "seize" those opportunities by mobilising their internal resources, and to "transform" their operations via continuous renewal and occasional strategic shifts. In this sense, SMP fits within what Teece et. al. describe as "ordinary capabilities" or "doing things right", while dynamic capabilities are concerned instead with "doing the right things".

BOS provides opportunities for the measurement of both ordinary and dynamic capabilities, with questions such as "How closely does this business work with customers [suppliers] to develop or improve products or services?" (sensing); "To what extent are non-managerial staff actively encouraged to suggest improvements to goods, services or processes? (seizing); and "... has this business done any of the following activities to get more benefit from its ICT?" [range of actions including introducing new work practices, restructuring the organisation, implementing new business strategies, and shifting production towards goods and services that use ICT more intensively] (transforming), as

[3] We exclude six skill-type specific training propensities (eg, the share of employees who received training in customer service/sales skills) from the results reported here, as the prevalence of different types of training is likely to relate as much to the structure and turnover of the workforce as to firms' standard training practices.

[4] Pells (2021) provides a summary of the Dynamic Capabilities approach, with a focus on the opportunities and challenges for measuring dynamic capabilities.

well as questions on day-to-day operational and human resource practices. However, as noted by Laaksonen and Peltoniemi (2018) with respect to the measurement of dynamic capabilities, it is important to consider not only the quantity of actions, experience and performance (the amount of money spent on R&D, the experience or education of the managerial team) but also the quality, variety and fitness of these actions and experience to the situation at hand – factors that are not generally observable through quantitative survey methods.

Section 5 provides a short discussion of the feasibility of using BOS data to examine the prevalence of SMP in New Zealand firms, including some exploratory analysis. The recent work of Ng (2021) explores the use of the BOS to infer the existence and level of dynamic capabilities, while Teece and Brown (2020) outlines concrete policy proposals to assist New Zealand firms to improve their dynamic capabilities.

This paper examines the evolution of management practices in New Zealand over time. Implicit in the discussion is an assumption that most, if not all, of the reported practices are beneficial – either to the firm itself in terms of productivity, profitability or resilience; to the workers in terms of the their working conditions and job satisfaction; or to the wider economy and society eg, through improved health and safety or environmental practices. However, this assumption is not necessarily well-founded, and may be situation dependent.[5] More of a given practice is not always better, especially when that practice comes at a cost, either directly or through diverting resources from other tasks.[6] Even where a particular practice seems to be unambiguously positive – for example, monitoring of the competitive environment – there are many different approaches which firms can take, some of which may be more successful than others, the detail of which cannot be captured in broad, quantitative surveys such as BOS. Assessment of the value of the practices studied is beyond the scope of this paper. Rather, the paper seeks to document and describe aggregate changes in the management and business practices of New Zealand firms over time, with a view to identifying potential strengths and areas of concern. We consider the proximate drivers of aggregate change – the role of broad changes in industry composition, and the relative roles of firm entry, exit, and within-firm practice change – but set aside questions about the underlying drivers of change, and hence the potential role for policy in encouraging firms, and managers, to assess and adjust their practices.

Future research in this area could usefully revisit the relationship between within-firm changes in management practices and changes in employee and firm outcomes,[7] and the

[5] See, for example Blader, Gartenberg, and Prat (2020) for an experimental study of a very specific human resource management change in different contexts within a firm, or Mayrhofer, Gooderham, and Brewster (2019) who provide a broader view of human resource practices in a national, institutional context.

[6] Consider, for example, the opening question of the BOS Business Practices module, which asks "How important are the following to the strategies of this business?", with a list of five strategies: pricing, quality, flexibility, delivery and innovation. While we might be concerned if a firm marked all these items as "not at all" or "a little important", we might be equally concerned if they marked every item as "very important", as this might suggest a lack of a coherent strategy or prioritisation processes.

[7] See Fabling and Grimes (2014) for an earlier paper using the first wave of the Business Operations Survey and its forerunner, the Business Practices Survey, to explore the impact of changing business practices on firm performance outcomes.

factors which appear to be driving the adoption of beneficial management practices over time.[8] An improved understanding of which practices are important, for which groups of firms, and the economic forces which drive firms to improve their practices, could inform a broad range of policy and regulatory areas, including investment promotion and competition policy as well as direct business support and training activities.

[8] See Bloom et al. (2019) for a recent US-based example using the Management and Organizational Practices Survey.

2 Data

Longitudinal data on Management Practices is sourced from the Business Operations Survey (BOS), an annual, modular survey administered by Stats NZ. The survey population is defined as all private-for-profit firms with a rolling mean employment of at least six (roughly 35,000 to 40,000 firms). From that population, between 5,500 and 7,500 useable responses are collected each year, based on a random sample of the population, stratified by industry and firm size.[9] The BOS data is linked to a wider collection of administrative and survey data within the Longitudinal Business Database (LBD), including the Longitudinal Business Frame (built from Stats NZ's Business Register) and detailed employment measures sourced from administrative tax data.[10]

The analysis draws on four waves of the BOS, from 2005 to 2017, which provide consistent measures of self-reported management practices among New Zealand firms.[11] Questions cover a range of topics including "strategy, goals and planning", "information and benchmarking", "quality and process", and "employee practices". In most questions, respondents are asked to report the strength or prevalence within their firm of a particular management practice, given a set of multi-choice response options. For example, in the strategy, goals and planning section, respondents are asked "Thinking about the goals set for this business, how far ahead does this business plan?" with response options including "up to 6 months", "up to a year" etc.

One limitation of this approach, relative to the detailed interview and observational studies carried out through the World Management Survey project (Bloom et al. 2012; Green et al. 2011), is that it relies on self-reported information about firm practices. As well as simple reporting inaccuracies, this can be problematic if interpretation of questions differs across respondents, or for the same respondent over time, in systematic ways. For example, as respondents' understanding of the external business environment improves, they may raise the threshold for what they consider to be a "systematic" comparison of their own performance with that of other firms. However, such concerns must be set against the value of the survey for tracking a broad range of practices across the population over a 12 year period – a feat that would not be feasible using more intensive observational methods.

A full copy of the survey questionnaire from 2017 is available in Appendix C. Although the survey has been run in almost identical form across the four waves, there have been some minor wording changes, and additional sub-questions have been added for some questions. These are outlined in appendix table C1. Sub-questions are excluded from the analysis if they cannot be tracked across all four waves of the survey.

[9] BOS response rates are consistently above 80 percent, with response being mandatory under the Statistics Act.

[10] See Fabling and Sanderson (2016) for more detail on the database as a whole and Fabling and Maré (2015) for an in-depth discussion of employment measures.

[11] The Business Practices module was run every four years between 2005 and 2017, with little change to the content. In 2021, a new module on "The Transition to a Low Emissions Economy" was run in place of the Business Practices module. The Business Practices module is expected to be run again in 2023.

In addition to maintaining a representative sample of firms in each year, Stats NZ's sampling methodology intentionally boosts the longitudinal coverage of the BOS through a panel top-up. All respondents to the 2005 survey were re-sampled in every year till 2011, regardless of whether they would have been included under the standard annual sampling procedure. The top-up sample was then re-set, with 2012 respondents re-sampled in the same way in every year since 2012. These top-up responses are allocated a weight of zero by Stats NZ in the preparation of their official statistics releases, but are available to researchers through the Stats NZ datalabs.

In order to maximise the within-firm longitudinal coverage of the data, we include all top-up respondents in the analysis, recalculating sampling weights based on population information from the Longitudinal Business Frame (LBF). That is, we use the most recent version of the LBF to identify the population of firms which met the criteria for inclusion in the BOS in each year. We then allocate positive sample weights to all firms for which we have good-quality BOS information, regardless of whether they had a positive weight in the official statistics. These sampling weights are defined as the inverse probability that a firm in a given industry-firm size stratum will have been selected into the BOS longitudinal sample: $P_j = N_j/n_j$ where N_j is the total number of firms in the population for stratum j and n_j is the number of firms available in the BOS sample. This recalculation also allows for a consistent industry definition to be imposed over time, papering over the switch from ANZSIC96 industry classifications to ANZSIC06 classifications which occurred in 2007.

In addition to a firm-level weighting (ie, what proportion of *firms* in the economy report a given practice?) we also present results weighted by firm employment (ie, what proportion of *workers* in the economy work for firms which report a particular practice?). Each firm is weighted by $L_{ij} = E_j/e_j \times RME_i$, where E_j and e_j are the population and sample employment counts for strata j and RME_i is the employment count of firm i (in strata j). Employment counts are taken from the firm-level labour tables developed by Fabling and Maré (2015).[12] The combination of re-weighting and the treatment of missing observations (discussed below) leads to discrepancies between the results reported here and official statistics produced by Stats NZ. These differences are fairly minor, seldom exceeding two percentage points on any particular response item.

Table 1 sets out the overall sample size for the surveys, and the associated population size, based on the weighting system described above. The sample captures between 16 and 20 percent of all firms in the BOS population, and around 50 percent of BOS-population employment.[13] Table 2 focuses on the two end years – 2005 and 2017 –

[12] In some cases, the Fabling and Maré (2015) employment counts differ substantially from those listed in the Longitudinal Business Frame, which is used by Stats NZ to define the BOS population. At the same time, the longitudinal top-up sample may lead to some firms being included in the sample even when their employment drops below the six RME threshold. In the interests of retaining BOS data for as many firms as possible, if a firm has responded to the BOS survey but is recorded as having fewer than six employees in the Fabling and Maré (2015) tables, we continue to include them in the results, allocating them an employment count of six.

[13] All firm and employment counts reported in this paper have been random rounded in accordance with Stats NZ confidentiality protocols.

and divides the sample for each year into three groups. Lines 1-3 take the sample of firms which appeared in BOS in 2005 and divides into three categories – those firms that are in BOS in both years (Continuers, shown in line 1 with weights and employment counts in 2005), those that remain active but do not have a BOS response for 2017 (Leavers) and those that no longer employ in 2017 (Exiters). Lines 4-6 present the same picture in reverse – again we see the firms which are in BOS in both years (Continuers, presented in line 4 with the weights and employment counts from 2017), those that were active in 2005 but were not in the BOS sample of that year (Joiners), and those that were not active in the earlier year (Entrants). For the purposes of this analysis, "activity" is defined as having non-zero employment.

Table 1: Sample and population sizes for BOS, 2005-2017

	Sample firm count	Population firm count	Coverage of firms	Sample employment	Population employment	Coverage of empl.
2005	7,353	35,322	0.21	569,800	1,088,200	0.52
2009	6,435	36,432	0.18	621,100	1,195,000	0.52
2013	5,862	35,865	0.16	592,000	1,177,000	0.50
2017	6,759	40,161	0.17	641,200	1,309,200	0.49

Table 2: Longitudinal coverage of BOS, 2005 and 2017

	N. firms (sample)	Weighted count	RME (sample)	Weighted RME	2005 status	2017 status
Continuers (2005)	2,352	9,411	277,300	455,800	BOS	BOS
Leavers	2,355	12,360	146,000	315,800	BOS	Active, non-BOS
Exiters	2,643	13,545	146,400	316,500	BOS	Non-active
Continuers (2017)	2,352	10,515	333,500	589,200	BOS	BOS
Joiners	2,025	12,309	156,100	328,500	Active, non-BOS	BOS
Entrants	2,382	17,334	151,700	391,600	Non-active	BOS

Column 1 identifies the number of firms in the sample belonging to each of the different categories. Firms observed in 2005 are roughly evenly split between firms which continue (2,352 firms or 32%), those which continue to operate but are not captured in the 2017 BOS (2,355 or 32%), and those which exit (2,643 firms or 36%). In 2017, the sample was slightly more heavily weighted towards new firms and continuing firms, rather than existing firms which joined the sample, but the differences are relatively small, with joiners making up roughly 30 percent of the sample, and entrants and continuing firms accounting for 35 percent each.

However, as smaller firms have both low sampling rates (implying both a higher weight placed on each sampled firm and a lower propensity for surviving firms to be re-sampled each year) and relatively high turnover rates (lower survival rates and higher entry rates), continuing firms make up a substantially smaller share of the estimated population when sampling weights are applied (column 2). Meanwhile, the difference in

firm entry and exit rates across firm sizes mean that when firms are weighted according to the number of employees, Continuers make up a much larger share of sampled employment (column 3), tempered slightly in the population view by the higher sampling rates (low weights) for these larger firms (column 4). In the discussion that follows we compare the relative roles of each of these firm groups in explaining changes in the prevalence of specific practices over time.

3 Methodology

The goal of this paper is to distinguish the relative importance of within-firm changes and compositional changes (across firms and industries) in driving the evolution of a particular set of management practices in New Zealand. As evident from the survey form, shown in Appendix C, most of the BOS response options are in the form of an ordinal list, rather than a simple binary yes/no response. To simplify the exposition, we reduce all ordinal measures to a [0,1] index following Bloom et al. (2019). "Don't know" and missing responses are allocated a value of zero, as are the lowest response option of each binary or ordinal list (eg, "no", "not at all" or "never").[14] Other response options are given an integer value from one to the number of remaining response categories (n). This number is normalised by $1/n$ to give the [0,1] index.

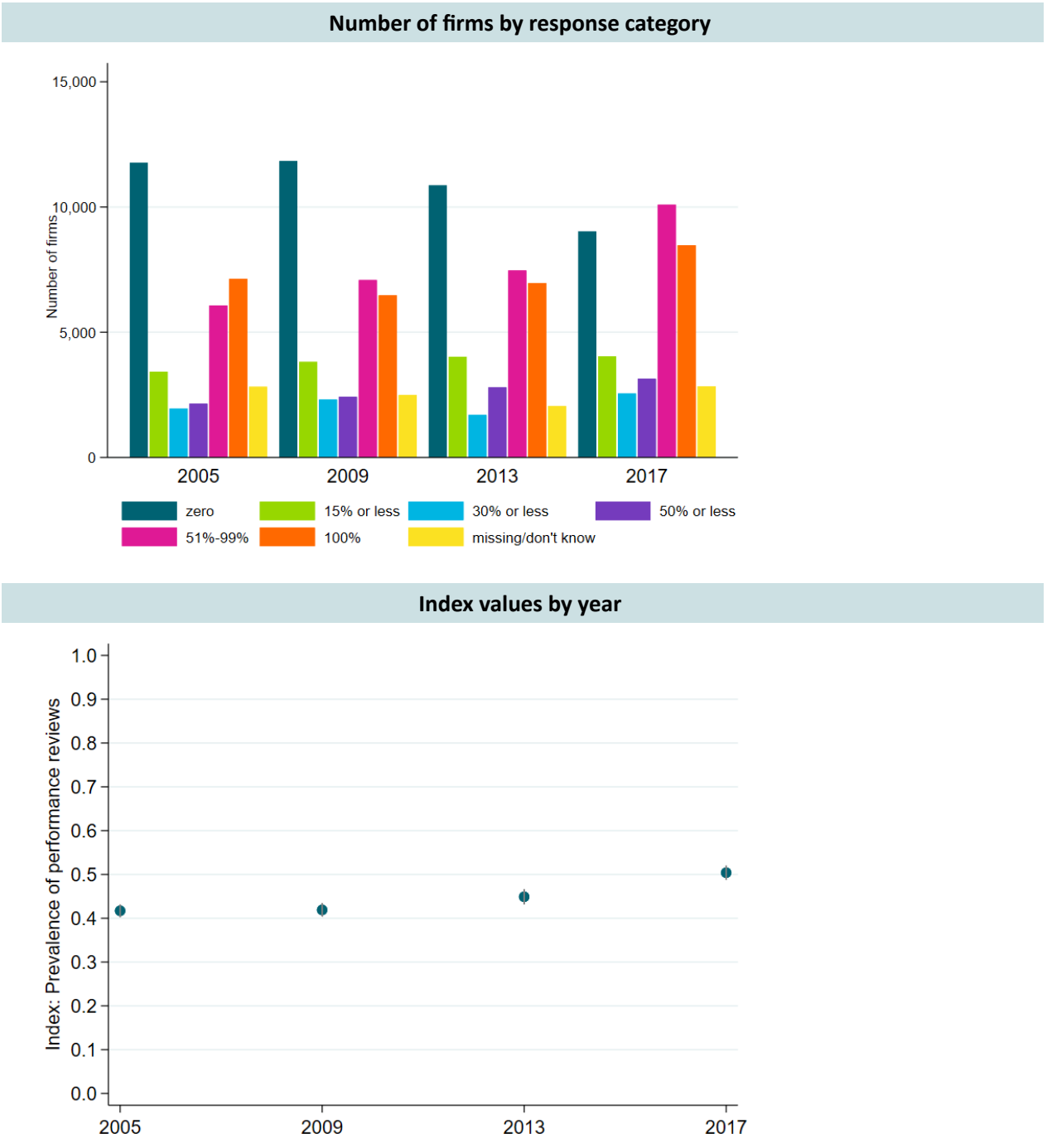
Figure 1 provides an example of the transformation of the raw data to the simplified index. The left-hand panel presents an aggregation of responses to the question "Over the last financial year, what percentage of employees in this business had formal performance reviews (consistent methods that are recognised and regularly used)?" Firm responses are divided into 6 categories, based on the multiple choice response options in the survey questionnaire. These range from "zero" to "100%" as well as the category of "missing/don't know". Thus, in the case of performance reviews, a firm which failed to respond or answered either "zero" or "don't know" will be allocated a value of zero ($0/5$), a firm which responded "51%-99%" takes a value of $4/5$, while a firm which selected "100%" takes a value of 1 ($5/5$). To obtain the aggregate population index shown in the right hand panel, these firm-level values are weighted by the firm-based sampling weights described above.

Several caveats arise from this transformation. Firstly, it is important to note that the prevalence index combines two aspects – the proportion of firms reporting a practice and the reported intensity. That is, we do not distinguish between shifts due to more firms reporting some level of practice (eg, moving from "zero" to "15% or less"), and shifts due to the existing firms reporting a higher intensity (eg, moving from "15% or less" to "50% or less"). Moreover, the translation of an ordinal (ordered) to a cardinal (countable) scale obscures any difference in the breadth of each option. This simplifying assumption is clearly violated in some cases (eg, where the response options refer to differently-sized spans of intensity) and is similarly debatable where subjective categories such as "a great deal" or "moderately important" are concerned, but is retained to enable the intensity aspect to be captured to some degree as well as the propensity aspect.

Secondly, the treatment of missing and don't know responses is equivalent to assuming that if a respondent is unaware of a practice, or fails to provide a usable response, they can be validly treated as not having that practice in place. For binary response questions (eg, yes/no) this means that the index can be translated as the estimated proportion of firms (or employment in firms) which answered "yes" to a particular question. For

[14] This step is taken to enable the full set of firms to be used with a consistent set of weights applied.

Figure 1: Example of index transformation – Formal performance reviews, firm-weighted



Note: Upper panel: Number of firms responding in each response category (shown in legend), to the question: "Over the last financial year, what percentage of employees in this business had formal performance reviews (consistent methods that are recognised and regularly used)?", weighted to reflect the population of BOS firms. Lower panel: Transformation to a single index per year. Errors bands show 95% confidence interval.

multiple choice responses, the interpretation is more complicated, due to the combination of intensity with existence of a practice. However, given these caveats, the index method provides a simple, full-coverage means to compare the prevalence of practices over time, enabling the decompositions to follow.

In order to identify the proximate drivers of aggregate practice change, we adapt the decomposition approach of Griliches and Regev (1995) to accommodate the use of longitudinal survey data. Our adaptation is based on Maré, Hyslop, and Fabling (2015), who use a similar approach to decompose aggregate productivity growth where some firms have missing productivity data in one or more years.

In a first step we look at whether overall changes in management practices reflect within-industry practice change, or changes in the industry composition of the economy. Averaging across the population, we define the overall index for any particular practice as:

$$A_t = \sum_i \omega_{it} X_{it} \tag{1}$$

where A_t represents the average level of the practice in the economy as a whole, at time t, defined as the weighted average of the individual firm-level indices (X_{it}). For the firm-weighted analysis, ω_{it} is defined as $P_i / \sum_i P_i$, where P_i is the inverse probability (sampling) weight associated with an individual BOS response. The corresponding employment weighted analysis sets ω_{ijt} to $L_i / \sum_i L_i$, where L_i is the employment weight detailed above.

To determine the role of industry composition, we aggregate to the industry level $(A_{jt} = \sum_i \omega_{ijt} X_{ijt})$ for each industry j and decompose the population-level change into a within-industry and an across-industry term:

$$\Delta A_t = \sum_j \overline{\omega}_j \Delta A_{jt} + \sum_j \Delta \omega_{jt} (\overline{A}_j - \overline{A}) \tag{2}$$

where an overline is used to indicate the average across two time periods, Δ indicates the change between the two periods, and ω_{jt} represents the weight of industry j in the BOS population as a whole. The within-industry term $(\sum_j \overline{\omega}_j \Delta A_{jt})$ therefore reflects changes in the prevalence of a particular practice within each industry (eg, greater adoption of formal goal setting processes among manufacturing firms) with each industry weighted by its average share across the two periods. The across-industry term $(\sum_j \Delta \omega_{jt} (\overline{A}_j - \overline{A}))$ reflects changes in the industry-composition of the economy eg, a growing number of firms (or increasing employment in the employment-weighted analysis) in an industry which already has a high degree of formal goal setting, or falling numbers of firms (or falling employment) in an industry in which goal setting is rare.

After the industry composition analysis, we turn to a firm-level analysis in section 4.3, extending the standard decomposition to accommodate the use of longitudinal survey data. Specifically, we apply the following decomposition:

$$
\begin{aligned}
\Delta A_t \quad = \quad & \textstyle\sum_{i \epsilon C} \overline{\omega}_i \Delta X_{it} && \textit{Within-firm} \\
& + \textstyle\sum_{i \epsilon C} \Delta \omega_{it} (\overline{X}_i - \overline{X}) && \textit{Across-firm} \\
& + \textstyle\sum_{i \epsilon N} \omega_{it} (X_{it} - \overline{X}) && \textit{Entrants} \\
& - \textstyle\sum_{i \epsilon X} \omega_{i,t-1} (X_{it-1} - \overline{X}) && \textit{Exiters} \\
& + \textstyle\sum_{i \epsilon J} \omega_{it} (X_{it} - \overline{X}) && \textit{Joiners} \\
& - \textstyle\sum_{i \epsilon L} \omega_{i,t-1} (X_{it-1} - \overline{X}) && \textit{Leavers} \qquad (3)
\end{aligned}
$$

which distinguishes firms which enter and exit the population – "entrants" (N) and "exiters" (X) – from those which remain active but enter or exit the survey sample – "joiners" (J) and "leavers" (L).[15] .

The overall change in the prevalence of a particular practice, or set of practices, is therefore separated into six elements – the *within-firm* portion due to changing practices within continuing firms ($\sum_{i \epsilon C} \overline{\omega}_i \Delta X_{it}$), the *across-firm* portion due to the changing weights applied to continuing firms with different average reported levels of practices ($\sum_{i \epsilon C} \Delta \omega_{it} (\overline{X}_i - \overline{X})$), and the portions due to changes in the survey sample due to changes in the population of firms (entry and exit) and changes in the sample captured by the survey (joining and leaving). In the firm-weighted analysis, the across-firm aspect for continuing firms reflects the changing weights applied to each stratum as the size of the underlying population changes as well as differences in weights applied across strata for firms which move between strata due to a change in their industry or firm size. In the employment-weighted analysis, the across-firm aspect captures these sampling and strata-based weight changes as well as changes in employment levels within each firm across survey waves.

This decomposition is applied both to the aggregate changes in the prevalence of each practice, and to changes in prevalence within ANZSIC06 divisions and within broad size classes. In the latter analysis, two new categories of firm are constructed: industry (or size class) entrants, and industry (or size class) exiters. These refer to continuing firms which move into or out of the relevant industry or size class between periods. For example, in the manufacturing industry analysis, a surviving firm that has above-average uptake of a given practice will reduce the industry average level of that practice if they leave the industry, or increase the industry average if they move into the industry from elsewhere. Similarly, as most practices are increasing in prevalence with firm size, a firm that transitions from the 6-20 employee size class to the 21-30 employee size class will likely reduce the prevalence of that practice in both size classes – leaving a size class where its index value was relatively high, and joining a size class where its index value is

[15] In theory, if joining and leaving the sample is largely random (eg, due to the sample resets undertaken by Stats NZ) then the net effect of joiners and leavers should be fairly muted and the observed decomposition should reflect true changes due to population composition and within firm changes. In practice, the net effect of joiners and leavers varies across practices, while the gross impacts tend to mirror those of entrants and exiters (discussed in section 4.3).

relatively low. These additional categories are reported separately in the firm-size specific analysis, as transitions between size classes are widespread. As transitions between industries are rare, reporting the impact of industry entrants and exiters separately is inconsistent with Stats NZ's confidentiality requirements. We therefore combine changes due to industry entrants and exiters with those of survey joiners and leavers, respectively. The results remain largely unaffected due to the small number of firms involved.

4 Results

This section sets out some broad conclusions around changes in management practices across this period. To keep the discussion manageable, we present only aggregate results for the majority of the surveyed practices, and focus attention on a select set of practices across three focus areas, denoted as "planning", "scanning" and "manning". The full set of results, across 58 individual practices covered by the survey, is available in the online data appendix, available at https://mbienz.shinyapps.io/management_practices_data_appendix. This interactive tool (Chen and Sanderson 2021) enables the reader to focus on the set of practices, weighting system (firm-based or employment-based), firm groupings (eg, selected size groups or industries), and output measures (eg, industry or firm-based decompositions) of most interest to them.

4.1 Comparisons across industries, firm sizes, and time periods

As an example of the types of breakdowns available, figure 2 provides a view of the relative prevalence of six selected practices, two from each of the three focus areas, comparing across firm-size classes, industries, and time, while also examining the impact of firm-based vs employment-based weighting systems. Table 3 gives the full text of the selected questions. The industry selection reflects a desire to include a wide range of industries, while also focusing on those industries which have both a large sample and a large contribution to the economy.[16]

The descriptive results in figure 2 illustrate a number of general points which can be observed throughout the data. Firstly, across all graphs it is clear that differences in the prevalence of practices between industries and firm-size groups are much more pronounced than within-group differences over time. This distinction is clearest for size groups, where there is a consistent monotonic relationship between firm-size groups and prevalence of practices – large firms are more active than small firms across all six practices.

In contrast, this monotonic relationship is not observed across industries. Rather, different industries have different areas of focus, in keeping with their key activities. For example, while the Health care & social assistance and Professional, technical & scientific services industries rank highly for their uptake of formal and long term planning practices, and their use of performance reviews, both industries are towards the bottom in terms of monitoring competitors' goods and services. While similar in some areas, the two industries are at opposite extremes in the use of performance pay, with Health care & social assistance having the lowest use of this practice among the selected industries, and Professional, technical & scientific services having one of the highest. Meanwhile, retail trade exhibits high levels of both monitoring of competitors'

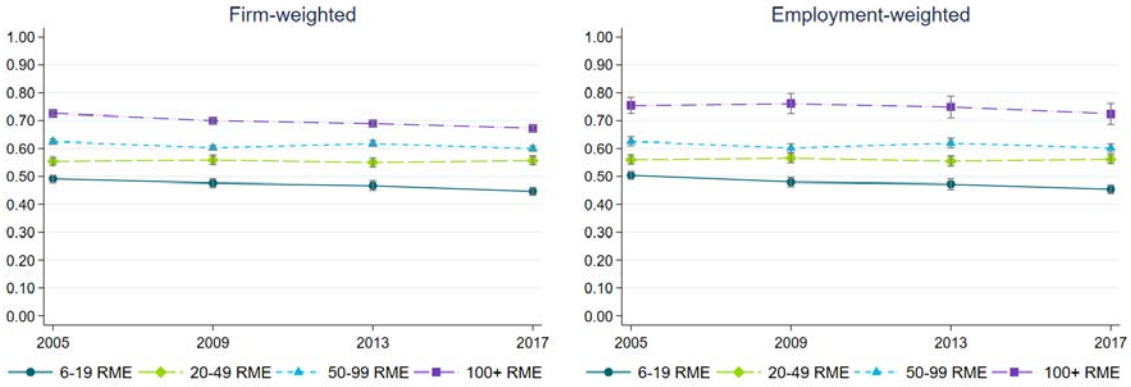
[16] Appendix tables A1 and A2 detail the population and sample sizes of the 18 industries covered by this study.

Figure 2: Variation in selected practice indices, by firm size, industry and year

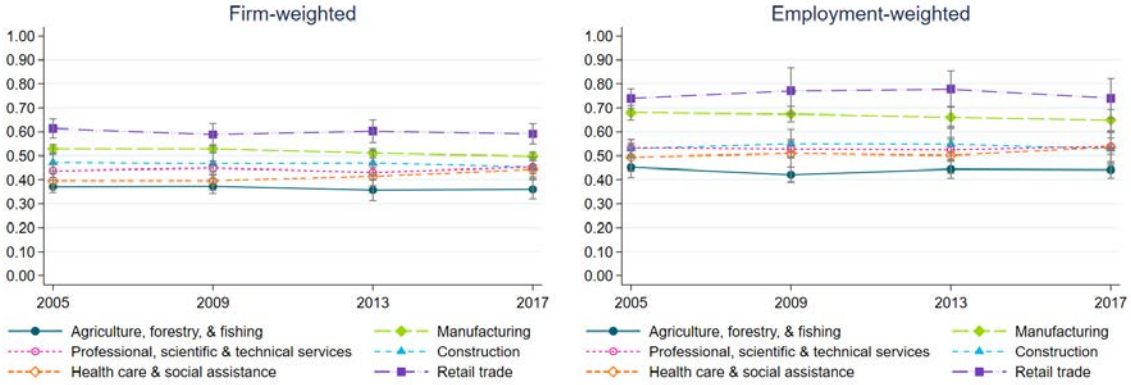
Figure 2 (continued): Variation in selected practice indices, by firm size, industry and year

Monitor competitors' goods or services

Firm size

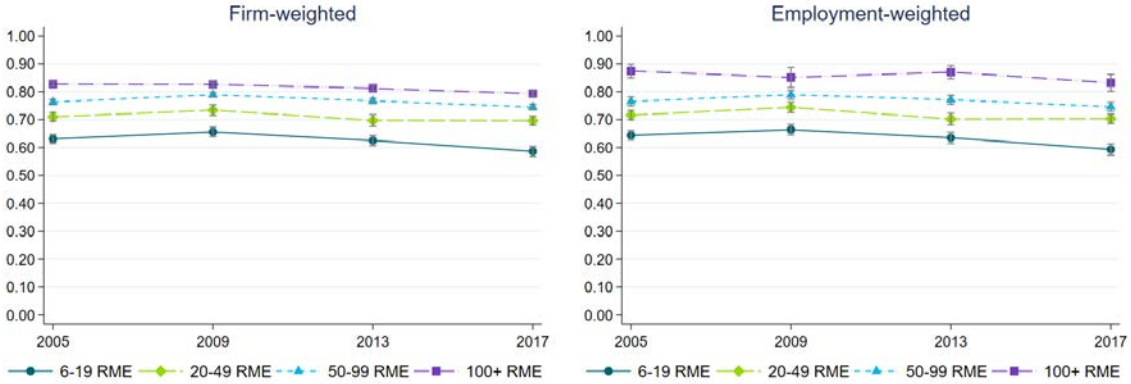


Industry



Identify risks or opportunities from changes in market conditions

Firm size



Industry

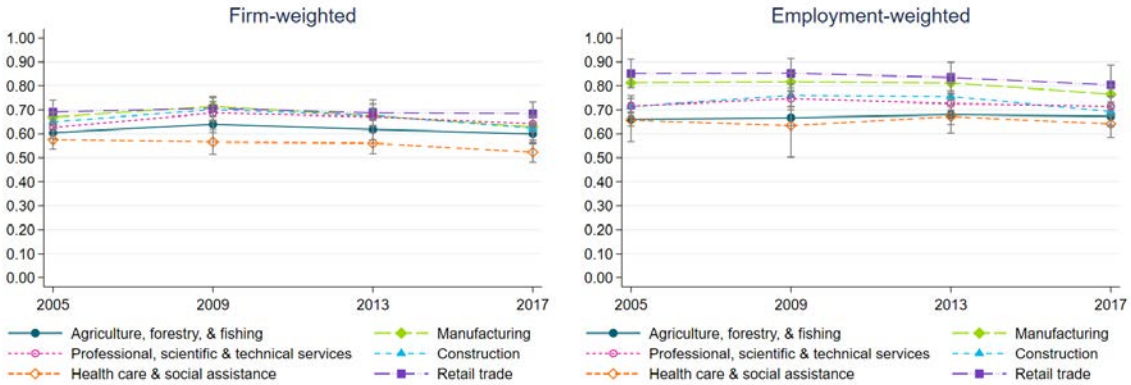
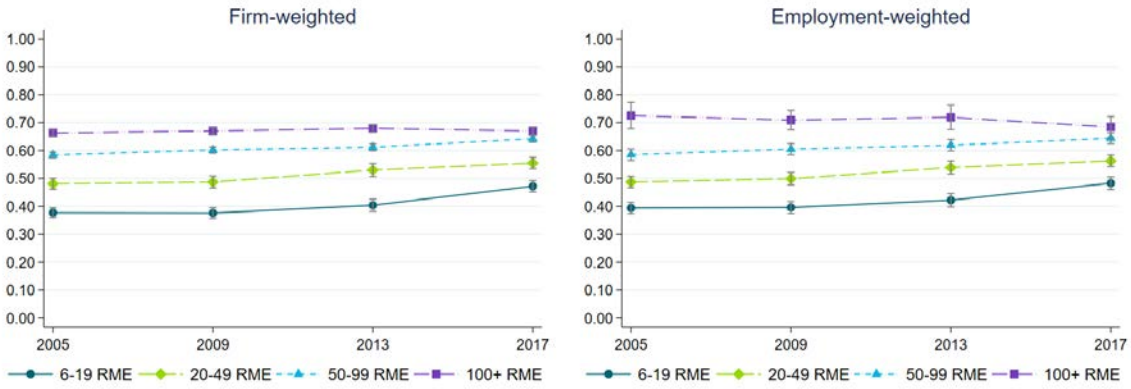


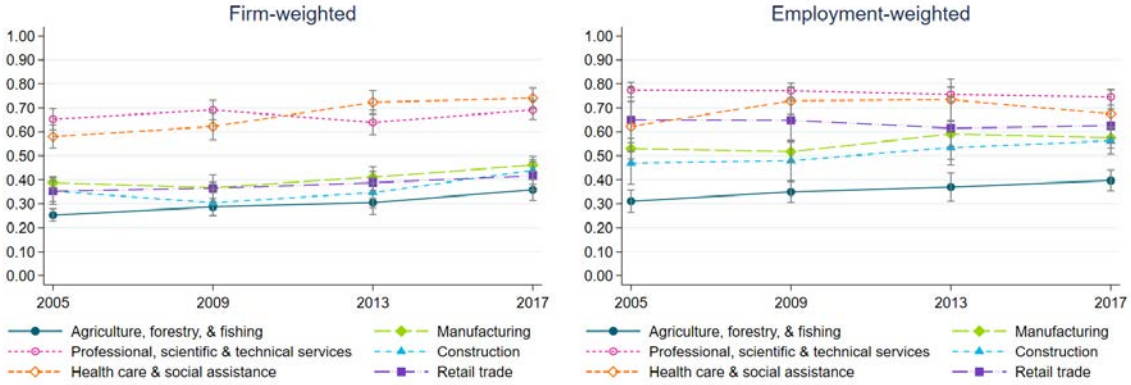
Figure 2 (continued): Variation in selected practice indices, by firm size, industry and year

Formal performance reviews

Firm size

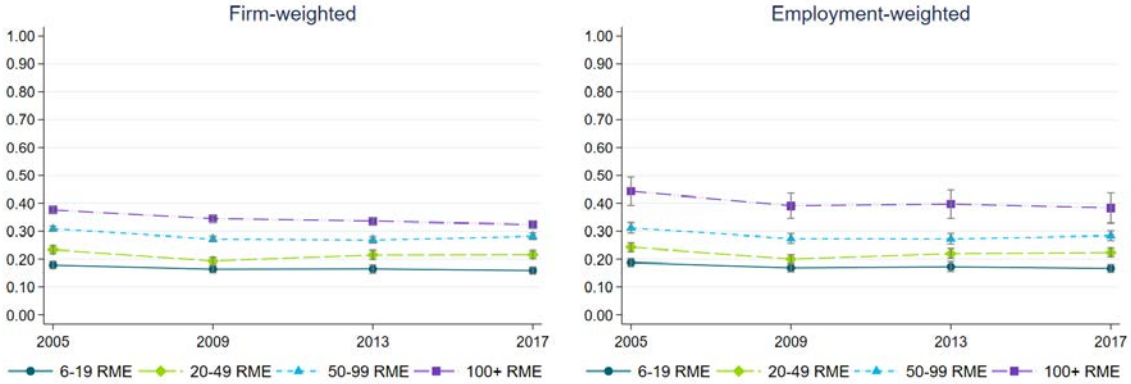


Industry



Pay for performance schemes

Firm size



Industry

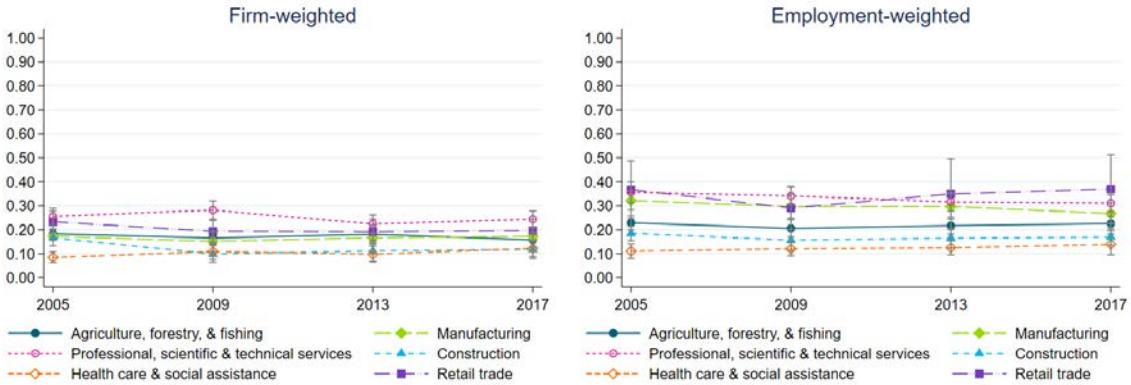


Table 3: Selected practices

Planning
Thinking about the goals set for this business, how far ahead does this business plan?
Are those goal normally developed through: formal processes/informal processes?
Scanning
How closely does this business monitor competitors' goods and services?
To what extent does this business attempt to identify risks or opportunities arising from changes in market conditions?
Manning
Over the last financial year, what percentage of employees in this business had formal performance reviews (consistent methods that are recognised and regularly used)?
What percentage of employees in this business are currently on 'pay for performance' schemes (productivity based incentives, profit sharing, bonuses, etc)?

goods and services as well as market conditions, and use of performance-based pay, but ranks lower on the use of performance reviews. This is consistent with the returns to different types of practices differing strongly across industries, and with industries having differential ability to influence and identify individual performance.

In the industry results, higher reporting rates among larger firms show up as higher overall levels of the employment-weighted indices than the firm-weighted indices, with particularly notable gaps observed in the Retail trade and Construction industries. Such differences at the industry level reflect both the difference in prevalence for different sizes of firm and the overall degree of size dispersion within the industry.[17] In most cases, movements in the firm- and employment-weighted indices remain quite similar, with a few exceptions. For example, larger firms in the Retail trade industry seem to be bucking the trends in the human resources area – while the use of formal performance reviews has increased and the use of performance pay schemes decreased over the period across most industries and size groups, these patterns are observed for retail only when looking at the firm-weighted indices, which are dominated by small firms. In contrast, the share of employees in retail firms which use these practices appears to have declined, in the case of performance reviews, and remained static, in the case of performance pay.

[17] Retail in particular has a relatively high dispersion in size, while Agriculture, forestry & fishing and Professional, scientific & technical services have relatively low dispersion.

4.1.1 Aggregate change in practices, 2005-2017

Figure 3 broadens the set of practices covered while limiting attention to the aggregate change in prevalence across the full population. Firm-weighted results are presented in the left-hand column and employment-weighted results on the right. Individual practices are displayed in groups roughly corresponding to the sections of the survey in which they occur.[18] Graphs are shaded based on the statistical significance of the *overall* change in the management practice index between 2005 and 2017. That is, solid bars indicate that the overall change was significantly different from zero at the 10 percent level, with the same shading applied to the decompositions presented in the next section.

By looking across the full suite of management practices we can distill some additional broad themes. First, while there is a lot of variety in terms of changes over time for the individual practices, we can see that groups of related practices have tended to experience a similar direction of change over the period, albeit with some clear exceptions. For example, while "planning" (eg, the length of planning horizons, the use of formal processes to develop goals, and the extent to which business plans and goals are communicated to employees) and "manning" (eg, employee training, and systematic assessment of employee performance, job satisfaction and skill gaps) activities have tended to increase in prevalence, "scanning" activities (eg, monitoring of other firms and potential risks and opportunities) seem to have reduced across a number of measures. However, while the prevalence of external scanning has fallen, the focus on assessing the firm's own operations has increased across a number of areas (panel: Information – assessment).

Several of the largest aggregate changes sit within a broad suite of measures around employee engagement and performance, including substantive increases in practices such as the formal assessment of performance and job satisfaction, and increased training and health & safety processes (panel: Employee practices), alongside an increased focus on HR measures as part of the business's performance assessment (panel: Information – assessment).[19] These changes appear to have been driven primarily by greater uptake among small firms, with most estimated changes being stronger in the firm-weighted than the employment-weighted results. This may reflect catch-up of smaller firms, which generally report lower levels of these (and most other) practices. However, the increased employee focus has not extended to increases in the reported involvement of staff in identifying problems or potential improvements to the firms' goods, services or processes (panel: Quality and process), in either the firm or employment-weighted results.

[18] Some long sections have been split into two themes (eg, "Strategy - focus" and "Strategy - planning"), while the "Supply chain linkages" group is an amalgamation of two separate sections on Customers and Suppliers.

[19] In some industries, and in smaller firms (6-19 RME), the increase in the share of firms reporting that they have health and safety processes in place coincides with the introduction of the Health and Safety at Work Act 2015. However, the prevalence of these practices was already high across most of the population and had been increasing in the more hazardous industries such as Agriculture, forestry & fishing and Construction (see Appendix D).

Figure 3: Aggregate change in practice indices, 2005-2017

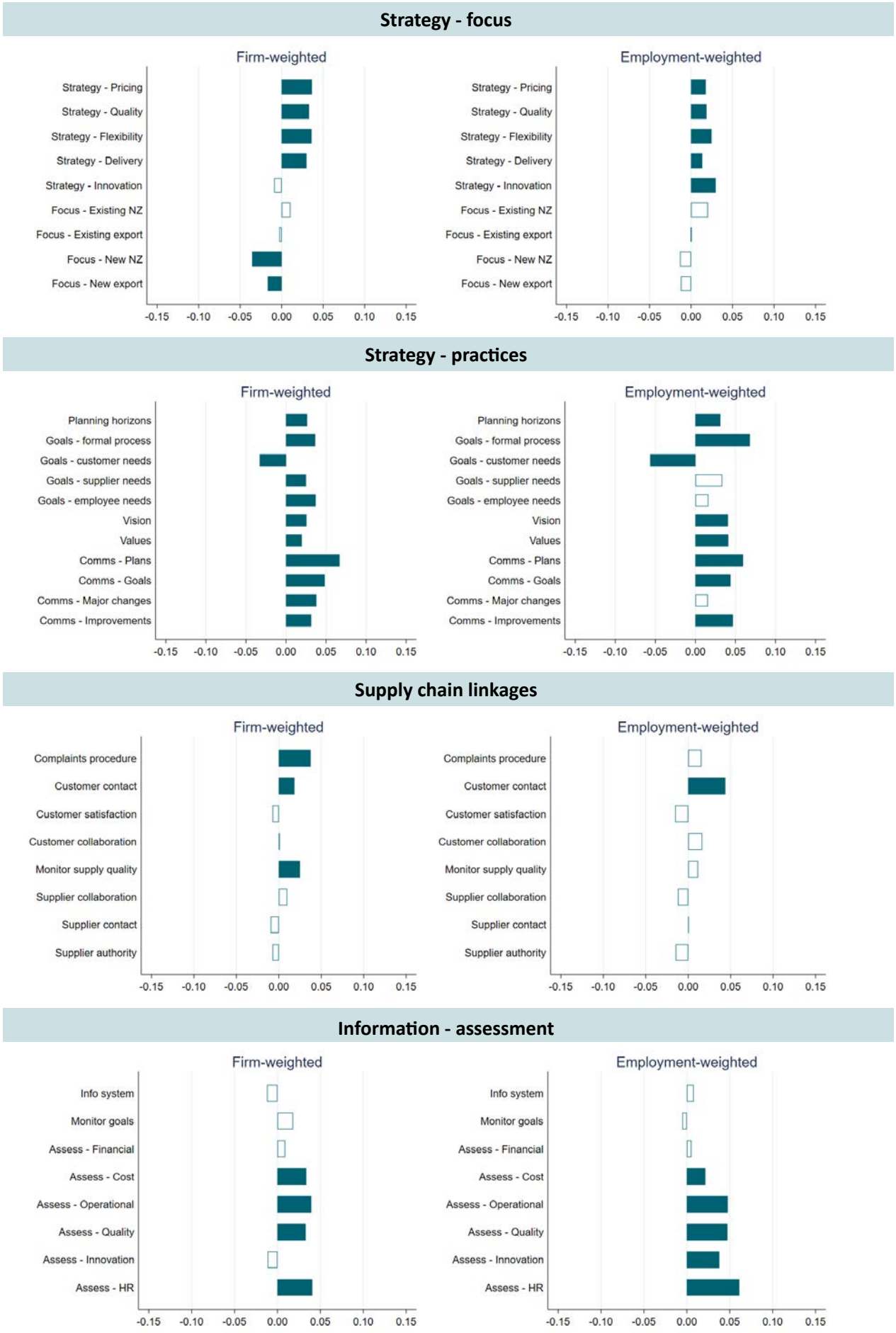


Figure 3 (continued): Aggregate change in practice indices, 2005-2017

In contrast to the increased focus on HR outcomes, we observe a reduction in external environmental scanning, with firms less likely to report that they are closely monitoring their competitors' goods and services, or attempting to identify risks or opportunities associated with changes in their competitors, market conditions or the availability of skills (panel: Information – scanning). Moreover, we see little change in the extent to which firms are systematically comparing their performance or processes with other groups of firms (panel: Information – scanning). Observed reductions in the extent to which firms are scanning for risks in the external environment are particularly strong in the employment-weighted results, suggesting that there may have been a systematic reduction in these activities in larger firms.

In general it does not seem that the changes we are observing are simply a tendency towards mean reversion (a tendency for those practices which were initially most prevalent to decline while those that were initially rare become more prevalent) as might be expected if the practice measures were very noisy or if the changes over time simply reflect a limited ability to increase uptake of practices which are already quite commonly used. Indeed, looking at the aggregate indices, we see a weakly positive correlation between the level of a particular index in 2005 and its change over the following 12 years (0.17 for firm-weighted and 0.05 for employment-weighted indices).[20] Moreover, several of the practices which were initially among the lowest have seen little or no increase in uptake, or in some cases have even contracted (eg, reported degree of focus on new or existing export markets), while some of those which were initially high have continued to increase (eg, health and safety processes). Appendix table B1 shows the levels of each index across all four years for comparison, weighted to reflect both the number of firms and the number of employees.

4.2 Decomposition – within vs across industry

We now turn to the question of establishing the proximate causes of the changes observed in figure 3. In order to provide a tangible example of the analysis, we consider again the six selected practices defined above. Results for other practices are available in the online data appendix.

Figure 4 reconsiders the aggregate changes described above, distinguishing the role of changes in industry composition from that of within-industry changes in practices, following equation 2. For this analysis, industries are defined at the two-digit ANZSIC06 level, of which there are 89 industries covered by BOS.

Changes in the industry composition of the economy have had limited impact on overall changes in management practices, with almost all of the aggregate change (or lack of change) driven by within-industry practice changes (at least as defined by ANZSIC 2-digit industry classifications). While figure 2 showed substantial differences in practices across (1-digit) industries, there has been relatively little change in the overall industry

[20] When each industryXpractice combination is included, a mild negative correlation is observed, with -0.06 in the firm-weighted and -0.21 in the employment-weighted results.

Figure 4: Industry decompositions, 2005-2017

Figure 4 (continued): Industry decompositions, 2005-2017

composition of the economy over this period.[21] However, there are a few areas where industry composition has notably reinforced within-industry practice changes – further increasing the extent to which non-sales staff have contact with major customers, and somewhat reducing the extent of external monitoring across a number measures (monitoring of competitors goods and services, and identifying risks and opportunities from market conditions and from competitors). An overall insignificant change in the extent to which firms focus on existing export markets may also be due in part to compositional change, as a small but positive within-industry shift in export market focus was fully counteracted by a reduction due to industry composition.

4.3 Decomposition – within vs across firms

While industry composition has had little apparent effect on managerial practices, firm composition has had a significant impact. Figure 5 examines the role of within vs across *firm* practice change, for our six example practices. These show a lot of variety across the six practices, with some common threads.

Firm exit tends to have a positive impact across all six practices, albeit playing only a small role in many. Exiting firms play a particularly large role in increasing the overall length of planning horizons, and in the use of formal planning processes in the employment weighted analysis. That is, the overall prevalence of longer term planning has increased primarily through the exit of firms with short planning horizons, while the prevalence of formal planning has risen due to the exit of large firms that used informal methods. This may reflect that some of these firms were already intending to exit, so did not need to make longer term plans, but is also consistent with the maxim that "failing to plan = planning to fail".

Looking beyond the six examples presented here, the finding that exit is an important element in explaining aggregate practice change is common across many of the other practices, particularly where the overall change is positive – that is, increases in the overall prevalence of the surveyed management practices are driven in a large measure by the exit of firms which do not have these practices in place (or which have them at a relatively low level). To the extent that these practices have a positive relationship with firm performance, this is consistent with a competitive environment in which low performing firms exit and are replaced by either the entry of new firms or the expansion of existing firms with better practices.[22]

In contrast, entering firms have a consistently negative impact on all six practices in the

[21] Appendix table A1 can be used to derive the change in the relative shares of different industries at the 1-digit level. Only two industries have experienced more than a two percentage point change in their share of aggregate (BOS population) activity – Manufacturing, which dropped from 21.6% of employment in 2005 to 15.9% in 2017 (16.1% to 12.6% in terms of firm counts), and Construction, which increased from 8.7% to 11.1% in terms of firm counts and from 6.1% to 7.6% in terms of employment share.

[22] Consideration of the underlying drivers of management practice change, including the role of competition, knowledge spillovers, and changing understanding of best practice, is beyond the scope of this paper. See Bloom et al. (2019) for an examination of drivers of the adoption of SMPs using U.S. survey data.

employment-weighted analysis, but varied impacts in the firm-weighted analysis. This suggests that young large firms look quite different from older large firms in terms of their practices, consistent with firms taking time to establish formal processes and practices. In contrast, smaller entrants look more like the average (small) firm in terms of their scanning and monitoring practices, while having somewhat longer and more formal planning practices, and a substantially higher tendency towards the use of performance based pay.

While never the most significant drivers of the overall change, transitions into and out of the survey (joiners and leavers) have a non-negligible effect on the aggregate results. In most cases, the direction of change due to joiners and leavers tends to mirror that of entrants and exiters – where entrants (exiters) have driven an increase in the overall prevalence of a practice, joiners (exiters) often have too. This may reflect the stratified sampling structure used by Stats NZ – because the sampling probabilities increase with larger firm-size strata, growing firms are more likely to join the sample over time, while declining firms are more likely to drop out of the sample. That is, sample joiners and leavers may represent a less extreme version of entrants and exiters.

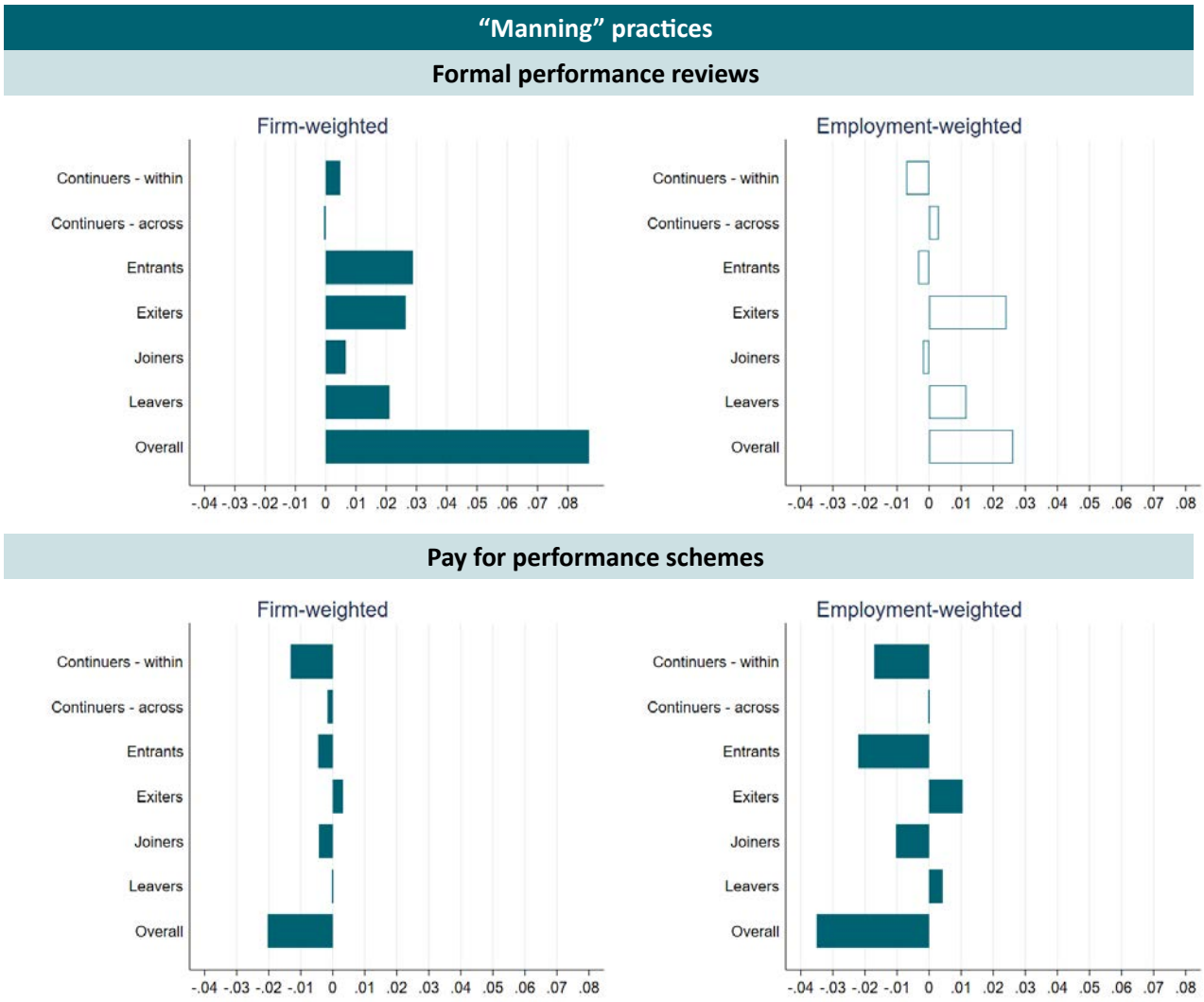
Finally, changing practices among continuing firms tend to move in line with the overall change in the prevalence of each practice. In some cases this has resulted in an increase in the prevalence of the practice (eg, the use of formal planning processes), but more often, in a decrease (eg, monitoring competitors goods and services, identifying risks and opportunities from market conditions, and the use of performance pay). The overall decrease in the use of these practices among continuing firms may reflect changes in the economic environment over the period (eg, if firms have experienced a reduction in the intensity of competition they may be less active in monitoring external conditions), but also implies that firms themselves do not see the surveyed practices as unambiguously valuable.

Finally, we consider whether the evolution of management practices has differed across industries or firm sizes. Here we present only a single example – the use of performance reviews – exploring how the overall change and the decomposition across firms differ for four size groups (figure 6) and four industry groups (figure 7). Solid bars indicate that the overall change for that industry or size group was significantly different from zero at the 10 percent level, with the same shading applied to all elements of the decomposition. As noted in section 3, firm size group analyses include two additional categories: “Continuers - enter group”, and “Continuers - exit group”, for continuing firms which move across size classes between survey waves, while the equivalent firms in the industry-level analysis are combined with the Joiners and Leavers groups respectively.

Considering first the firm-size groups, the results in figure 6 reinforce those of figure 5: the increase in the use of formal performance reviews over this period was large in aggregate, but was driven by increased uptake among small and medium firms. Consistent with the lack of a significant change in the employment-weighted results in figure 5, figure 6 shows no significant change in the use of performance reviews among the largest firm size group (100+ RME), and indeed some suggestion of a decline in use

Figure 5: Decomposition of practice changes by firm dynamics, 2005-2017

Figure 5 (continued): Decomposition of practice changes by firm dynamics, 2005-2017



among the largest firms. In contrast, the overall use of performance reviews has increased over the period among the small to medium size groups, driven almost entirely by firm turnover, both in terms of firm entry and exit and changing sample compositions. Both the departure of firms with relatively low use of performance reviews and the appearance of new firms with higher levels have contributed to the overall rise, while relatively little of the change is associated with existing firms changing their practices. While firm entry and exit are the more significant factor among very small firms (where actual entry and exit are more common), the medium size firm groups also see a notable impact of the changing sample composition, in a consistent direction with population entry and exit.

Turning to the industry analysis, we see significant variation in the direction, magnitude, and proximate drivers of change both across industries and across weighting schemes within industries. In many cases, the overall change in prevalence across the period was not significantly different from zero, reflecting the smaller sample sizes available at this detailed level. In Agriculture, forestry & fishing, where significant results are observed for both the firm and employment-weighted results, they remain largely consistent with the overall and size-based decompositions: increases in uptake are stronger in the firm-weighted results, and are associated primarily with firm turnover. In Manufacturing, only the firm-weighted results show significant change in the use of performance reviews, with entry, exit, and sample composition all contributing to the overall increase.

Figure 6: Decomposition by firm dynamics – Performance reviews, by firm size group

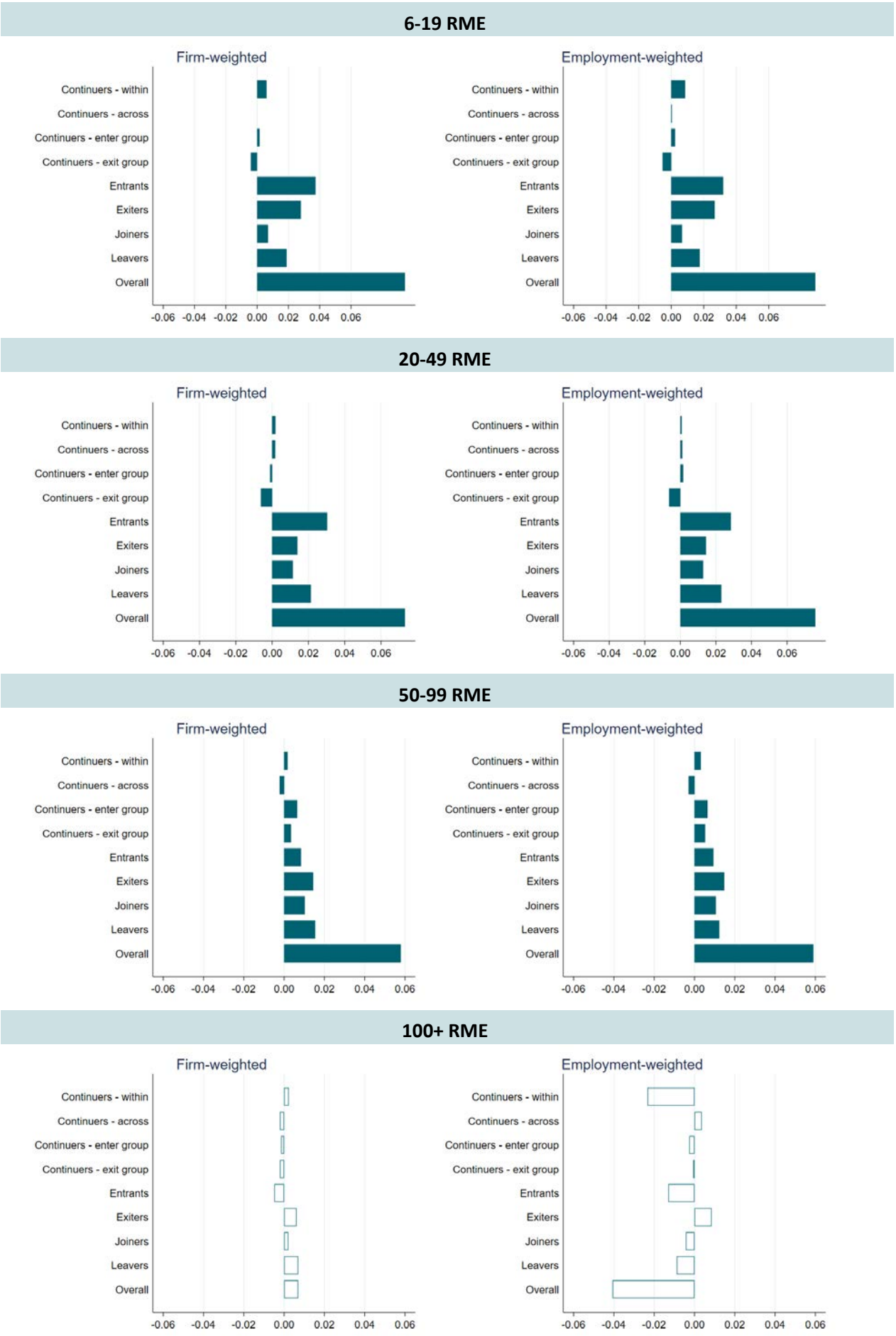
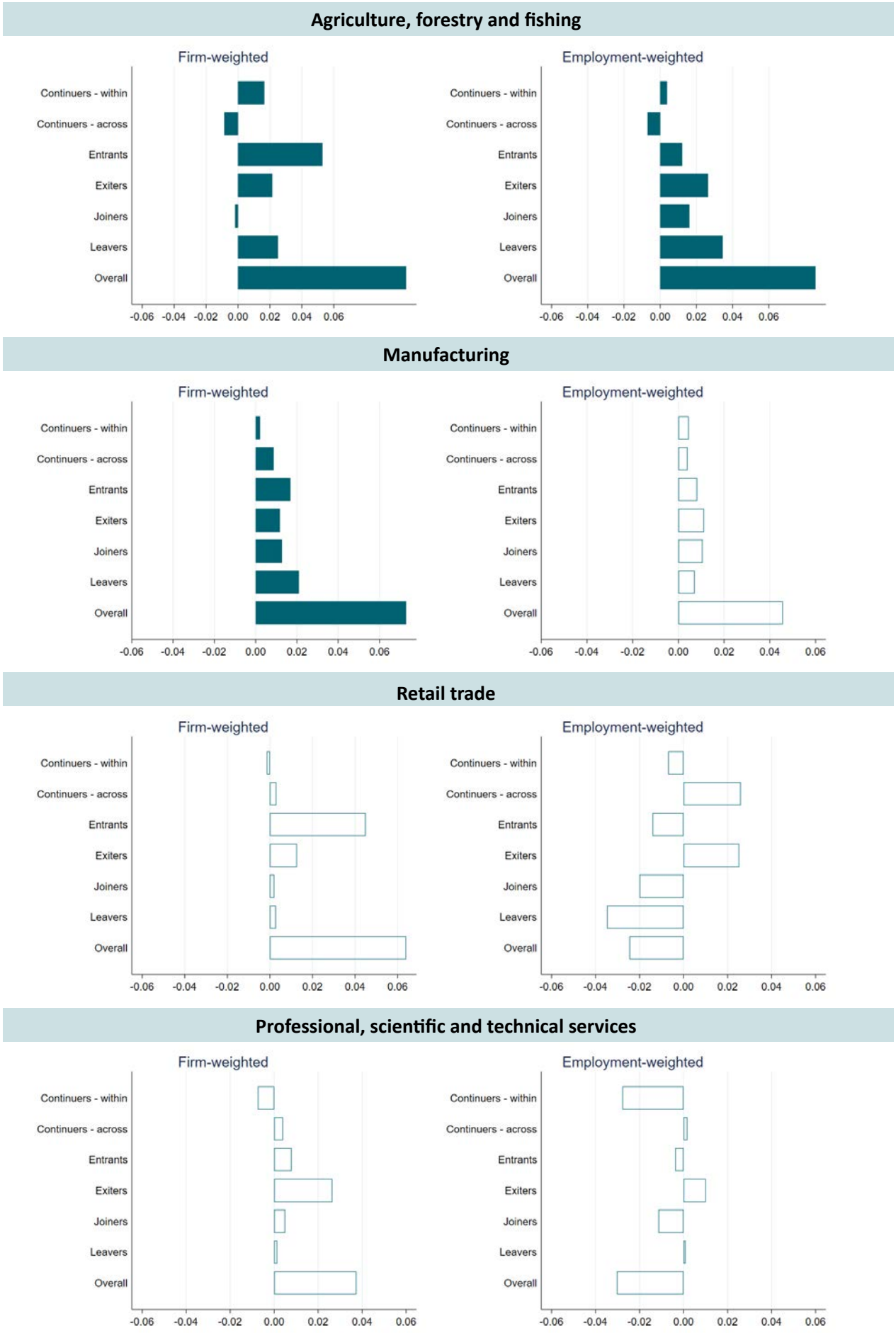


Figure 7: Decomposition by firm dynamics – Performance reviews, by industry



5 Exploring the SMP index approach

In this final section, we explore the feasibility of creating an index of Structured Management Practices (SMP), based on the three key facets of the Bloom et al. (2019) index – Targets, Monitoring, and Incentives. In principle, the BOS captures aspects of each of these three facets, with sections on Strategy, goals & planning; Information & benchmarking; Employee practices; and Quality & process. However, in practice the overlap between the two sources is weak, as the BOS is broader in coverage and much less specific in content than the MOPS survey used by Bloom et al. For example, where Bloom et al. (2019) consider "targets", they are focused specifically on production targets – a very tangible, physical measure. In contrast, the BOS-based measures are about the process of developing "goals" – which may include factors such as environmental concerns or employee wellbeing alongside more concrete goals such as productivity or profitability. Similarly, the MOPS-based "monitoring" questions are about KPIs, whereas BOS has questions such as "Is it part of the regular work of one or more people ... to assess whether this business is achieving its goals?" In terms of incentives, BOS asks about the prevalence of performance reviews and performance-based pay, rather than the more specific questions on performance bonuses included in MOPS.

Table 4 sets out the questions used by Bloom et al. (2019) against a selected set of proxy questions available in BOS. Clearly this is not the only set of possible comparator questions. Alternatives might focus more strongly on process – such as documentation of operating processes/systems, or the extent of quality assessment undertaken before goods and services are delivered to customers.

As such, the example index below is included purely as an example – other combinations of practices would certainly give a different impression of the change in the level of structured management practices, and no combination of the available questions is closely comparable with the practices collected in the WMS or MOPS due to the differences in the style and breadth of questions asked.

Figure 8 presents the evolution of this experimental index from 2005-2017. The overall index shows a marginal improvement over the period across most size groups and industries (figure 8), primarily due to the exit of firms with relatively low values of the index (figure 9). Comparison of the firm-weighted and employment-weighted results show that while larger firms tended to increase their use of this package of practices (as shown by the positive contribution of continuing firms), this was not the case among smaller firms, with the firm-weighted results showing instead a larger positive contribution from the entry of new firms with above average usage.

The finding of little change in the overall index reflects contradictory movements in the underlying practice indices – while all three "targets" related practices (planning horizons, formal goal setting practices, and communications regarding goals) have increased, there has been a drop in the reported use of performance pay, as shown in the previous section (see figure 3). Firms were reporting greater use of performance reviews at the end of the period than at the beginning, but weighting by employment

Table 4: Comparison of MOPS-based index of Structured Management Practices and BOS-based proxy

MOPS	BOS
Targets	
What best describes the time frame of production targets...?	Thinking about goals set for this business, how far ahead does this business plan?
How easy or difficult was it ... to achieve ... production targets?	Are those goals mainly developed through: formal processes/informal processes?
Who was aware of production targets...?	Are employees in this business regularly communicated with regarding goals?
Monitoring	
What best describes what happened ... when a problem in the production process arose?	To what extent are non-managerial staff actively encouraged to identify problems in goods, services or processes?
How many key performance indicators were monitored...?	Number of aspects marked "a great deal" in the question "To what extent did this business focus on the following when assessing performance?"
How frequently were the key performance indicators reviewed by managers? By non-managers?	Is it part of the regular work of one or more people (either staff or outside contractors) to assess whether this business is achieving its goals?
Where were the production display boards showing output and other KPIs located...?	
Incentives	
What were non-managers' performance bonuses usually based on...?	What percentage of employees had formal performance reviews?
When production targets were met, what percent of non-managers...received performance bonuses?	What percentage of employees are currently on "pay for performance" schemes?
What were managers' performance bonuses usually based on...?	

Figure 8: Variation in SMP index, 2005-2017

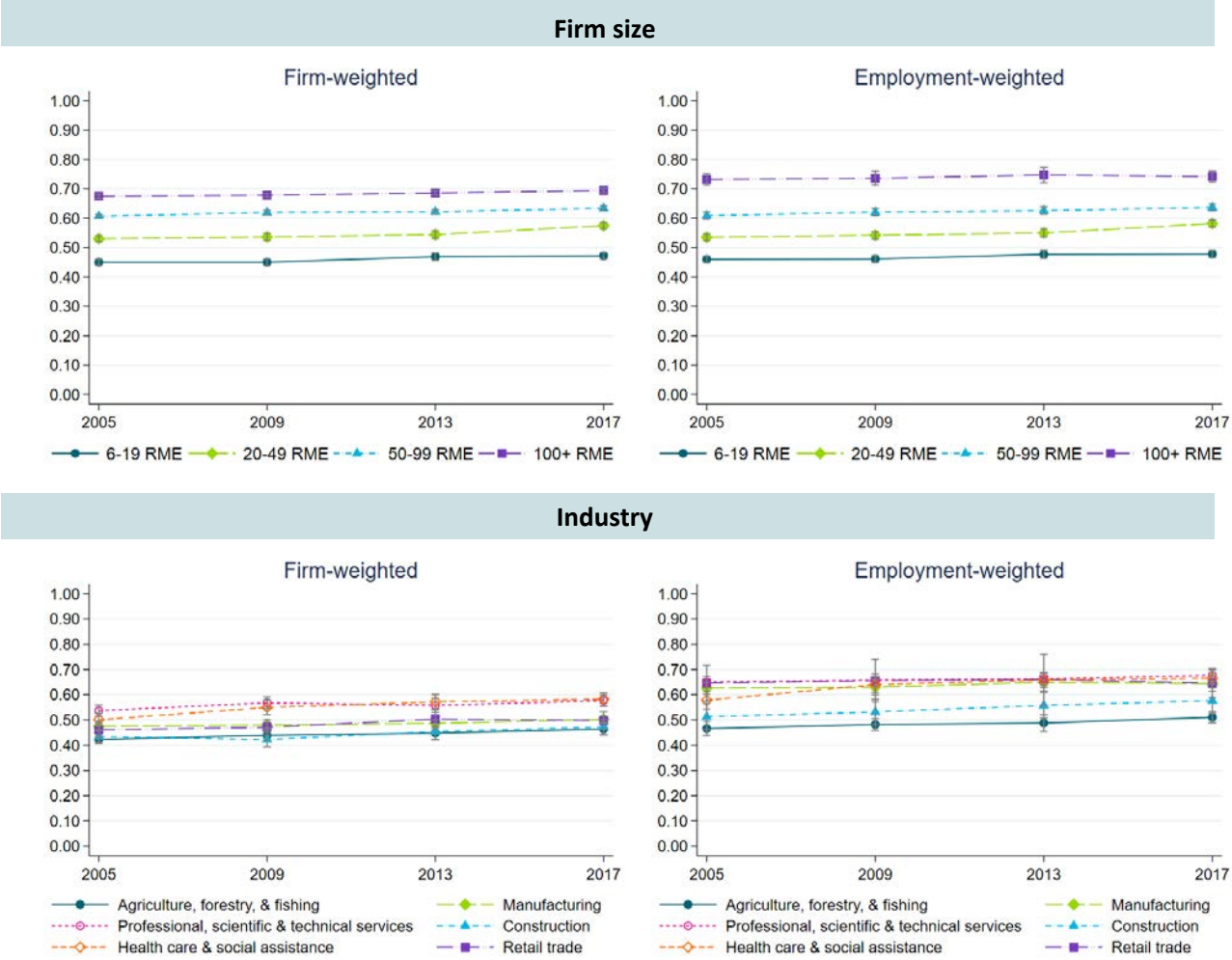
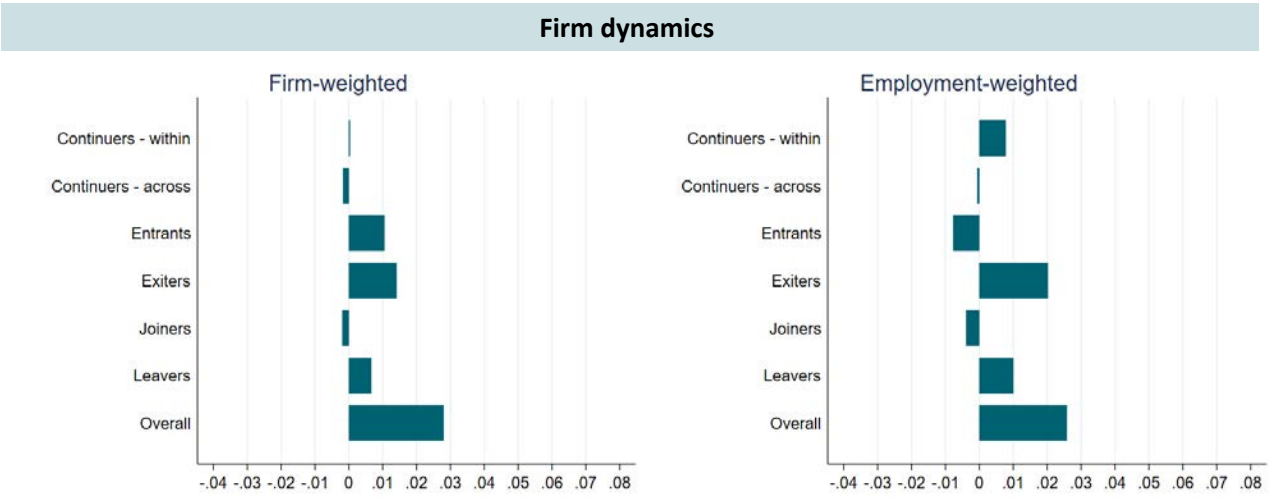


Figure 9: Decomposition of change in SMP index by firm dynamics, 2005-2017



shows that this change has mainly been influenced by smaller firms, such that the total number of employees affected appears largely unchanged (figure 3, Employee practices). "Monitoring" practices have changed little on average over the period, with no significant changes in the aggregate prevalence of either the extent to which staff are encouraged to identify problems with goods, services, or processes (figure 3, Quality and process), or the likelihood that firms report that there is someone tasked with assessing whether the business is achieving its goals (figure 3, Information – assessment). Meanwhile, the breadth of assessment has increased over time, across multiple measures (costs, operational, quality, and human resources), such that the average number of measures assessed by firms has increased over time.

Overall, this limited exploration of "structured" management practices shows that there have been only mild increases in the uptake of practices related to those documented by Green et al. (2011) in 2009, with contradictory movements across the different component practices. As such, it seems unlikely that a repeat of the study would find that New Zealand's management practices were improving relative to the comparator countries included in the earlier study. However, the ability to use the BOS practices measures to derive conclusions about SMP is very limited, given the less specific nature of these questions.

6 Conclusions

This paper reports on the evolution of a range of practices in New Zealand firms, as captured by the Business Operations Survey's Business Practices modules from 2005 to 2017. Simple descriptive analysis of the overall change across the wide range of practices covered by the survey (figure 3) suggests that New Zealand firms as a whole have moderately increased their uptake of some specific practices, particularly those around the setting and communication of goals and strategies, and increased monitoring of employee skill needs and outcomes including employee performance and job satisfaction. In contrast, external focus appears to have decreased in terms of the monitoring of external risks and opportunities, with little or no change in many practices associated with supply chain linkages and benchmarking against other firms. However, the overall change has tended to be quite limited across most practices, with firm-size and industry differences in uptake dwarfing changes in uptake over time.

Changes in industry composition have been relatively limited in New Zealand over this period. As such, even though there is substantial diversity in the uptake of practices across industries, compositional change in the economy has had little impact on the overall prevalence of most practices. In contrast, compositional change at the firm level – the entry and exit of firms with different levels of uptake – has been a significant part of the observed changes in the aggregate practice indices.

Entry and exit have been particularly relevant for practices which have experienced an increase in prevalence over the period, consistent with competitive effects which favour firms with good practices. The role of turnover in the survey sample has tended to reinforce the effects of firm entry and exit, which may reflect a weaker form of the same patterns – firms which grow are more likely to enter the survey sample while those which shrink are more likely to drop out.

In contrast, the decrease in some practices has often been driven by continuing firms dropping or reducing their use of these practices. In some cases this may reflect changes in the competitive environment (eg, firms may be less inclined to identify risks associated with skill availability in 2017 than they were under the tight labour market conditions of the mid-2000s) while in others it appears to reflect conscious choices of the firms to reduce their use of particular practices (eg, performance pay).

Attempts to compare management practices in New Zealand with those in other countries are hampered by a lack of consistent data. As BOS is designed to capture representative information for a wide spectrum of New Zealand firms, the questions asked are necessarily broad and lack the production focus of the MOPS and WMS surveys. The development of the ABS's Management and Organisational Capabilities Module, which has been used by the Australian Department of Industry, Innovation and Science to develop a series of management capability scores for Australian firms (Agarwal et al. 2019) suggests a promising alternative which could potentially be adapted for use in the BOS to provide a trans-Tasman comparison of management practices.

Implicit (and sometime explicit) in the discussion above, is that the practices reported in the survey are, in general, positively related to firm performance. However, this assumption is not necessarily well-founded, and may be situation dependent. Future research in this area could update and extend work by Fabling and Grimes (2014) to examine the relationship between within-firm changes in practices and the outcomes experienced by the firm and its employees, such as productivity, employment, average wages, and worker turnover.

References

Agarwal, Renu et al. (2019). *Development of management capability scores*. Research Paper. Department of Industry, Innovation and Science.

Allan, Corey and Lynda Sanderson (2021). *Labour market impacts of technology change: Evidence from linked employer-employee data*. CEU Working Paper 21/02. Ministry of Business, Innovation and Employment.

Bajgar, Matej et al. (2019). "Superstar firms are running away with the global economy". Harvard Business Review, HBR Digital Article, November 14 2019.

Blader, Steven, Claudine Gartenberg, and Andrea Prat (2020). "The Contingent Effect of Management Practices". In: *Review of Economic Studies* 87.2, pp. 721–749.

Bloom, Nicholas et al. (2012). "Management Practices across Firms and Countries". In: *Academy of Management Perspectives* 26.1, pp. 12–33.

Bloom, Nicholas et al. (2013). "Does Management Matter? Evidence from India". In: *The Quarterly Journal of Economics* 128.1, pp. 1–51.

Bloom, Nicholas et al. (2016). "International Data on Measuring Management Practices". In: *American Economic Review: Papers and Proceedings* 106.5, pp. 151–156.

Bloom, Nicholas et al. (2019). "What Drives Differences in Management?" In: *American Economic Review* 109.5, pp. 1648–1683.

Chen, Lucas and Lynda Sanderson (2021). *The Evolution of Management Practices in New Zealand, 2005-2017: Interactive data appendix*. Available at: WEBSITE XXX.

Climate Leaders Coalition (2021). *Climate Leaders Coalition website*. https://www.climateleaderscoalition.org.nz/. Accessed: 20 August 2021.

Fabling, Richard and Arthur Grimes (2014). "The "Suite" Smell of Success: Complementary personnel practices and firm performance". In: *ILR Review* 67.4, pp. 1095–1126.

Fabling, Richard and David Maré (2015). *Addressing the absence of hours information in linked employer-employee data*. Working Paper 15-17. Motu Economic and Public Policy Research.

Fabling, Richard and Lynda Sanderson (2016). *A rough guide to New Zealand's Longitudinal Business Database (2nd edition)*. Working Papers 16-03. Motu Economic and Public Policy Research.

Green, Roy et al. (2011). *Management matters in New Zealand*. Occasional Papers 11/03. Ministry of Business, Innovation and Employment.

Griliches, Zvi and Haim Regev (1995). "Productivity and Firm Turnover in Israeli Industry: 1979-1988". In: *Journal of Econometrics* 65.1, pp. 175–203.

Independent Taskforce of Workplace Health and Safety (2013). *The Report of the Independent Taskforce of Workplace Health and Safety*. Collected reports on the Taskforce website, http://hstaskforce.govt.nz/. Accessed: 4 June 2021.

Laaksonen, Ola and Mirva Peltoniemi (2018). "The Essence of Dynamic Capabilities and their Measurement". In: *International Journal of Management Reviews* 20.

Lilley, Rebbecca et al. (2021). "Decade of fatal injuries in workers in New Zealand: Insights from a comprehensive national observational study". In: *Injury Prevention* 27.2, pp. 124–130.

Maré, David, Dean Hyslop, and Richard Fabling (2015). *Firm productivity growth and skill*. Working Paper 15-18. Motu Economic and Public Policy Research.
Mayrhofer, Wolfgang, Paul N. Gooderham, and Chris Brewster (2019). "Context and HRM: Theory, Evidence, and Proposals". In: *International Studies of Management and Organization* 49.4, pp. 355–371.
MBIE (2020a). *Briefing for Incoming Minister for Workplace Relations and Safety*. https://www.mbie.govt.nz/about/who-we-are/our-ministers/briefings-to-incoming-ministers/, Ministry of Business, Innovation and Employment.
– (2020b). *Briefing for Incoming Minister of Economic Development*. https://www.mbie.govt.nz/about/who-we-are/our-ministers/briefings-to-incoming-ministers/, Ministry of Business, Innovation and Employment.
McKenzie, David and Christopher Woodruff (2014). "What are We Learning from Business Training and Entrepreneurship Evaluations around the Developing World?" In: *World Bank Research Observer* 29.1, pp. 48–82.
– (2017). "Business Practices in Small Firms in Developing Countries". In: *Management Science* 63.9, pp. 2773–3145.
Ministry for the Environment (2021). *Understanding New Zealanders' attitude to the environment*. https://environment.govt.nz/facts-and-science/science-and-data/understanding-new-zealanders-attitudes-to-the-environment/, Ministry for the Environment.
New Zealand Government (2012). "Health and safety review taskforce appointed". Press release, https://www.beehive.govt.nz/release/health-and-safety-review-taskforce-appointed. Accessed: 4 June 2021.
Ng, Tim (2021). *Schumpeterian endogenous growth and dynamic capabilities: an under-researched nexus?* Unpublished research paper.
Pells, Sharon (2021). *Dynamic capabilities: What are they and can they be measured?* Unpublished report. Ministry of Business, Innovation and Employment.
Schwab, Klaus (2016). "The Fourth Industrial Revolution: what it means, how to respond". Online article, World Economic Forum, https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/. Accessed: 26 July 2021.
Teece, David and Kieran Brown (2020). *New Zealand Frontier Firms: A capabilities-based perspective*. BRG Institute. Report prepared for the New Zealand Productivity Commission.
Teece, David J. (2019). "A Capability Theory of the Firm: An economics and (Strategic) management perspective". In: *New Zealand Economic Papers* 53.1, pp. 1–43.
Teece, David J., Gary Pisano, and Amy Shuen (1997). "Dynamic Capabilities and Strategic Management". In: *Strategic Management Journal* 18.7, pp. 509–533.
Worksafe (2021). *Managing Health and Safety: Getting started*. Website https://www.worksafe.govt.nz/managing-health-and-safety/getting-started/.

Appendix A: Sample and population size by industry

Table A1: Population size by ANZSIC06 1-digit industry

	2005		2017	
	Firms	Employees	Firms	Employees
Agriculture, forestry and fishing	3,186	52,300	3,576	68,100
Mining	87	2,900	111	5,100
Manufacturing	5,688	234,600	5,073	208,100
Electricity, gas, water and waste services	93	4,500	150	10,100
Construction	3,078	66,500	4,455	99,600
Wholesale trade	2,928	81,500	3,045	88,700
Retail trade	4,425	161,100	4,392	177,100
Accommodation	4,179	90,100	5,529	113,300
Transport, postal and warehousing	1,434	50,300	1,539	79,700
Information, media and telecommunications	390	32,400	369	29,900
Financial and insurance services	600	49,300	564	55,300
Rental, hiring and real estate services	945	17,500	888	19,100
Professional, scientific and technical services	3,015	72,400	3,939	106,700
Administrative and support services	1,350	73,000	1,596	94,100
Education and training	651	14,400	936	26,700
Health care and social assistance	1,917	58,900	2,481	96,600
Arts and recreation services	441	14,900	480	17,800
Other services	921	11,600	1,041	13,400
Total	35,322	1,088,200	40,161	1,309,200

Table A2: Sample size by ANZSIC06 1-digit industry

	2005		2017	
	Firms	Employees	Firms	Employees
Agriculture, forestry and fishing	801	21,600	576	26,500
Mining	57	1,800	81	4,200
Manufacturing	1,539	137,500	1,458	124,200
Electricity, gas, water and waste services	15	1,900	108	8,700
Construction	435	26,600	393	39,500
Wholesale trade	570	40,900	546	47,700
Retail trade	432	79,500	327	44,500
Accommodation	291	26,900	264	22,100
Transport, postal and warehousing	432	30,400	306	53,100
Information, media and telecommunications	219	26,100	210	23,100
Financial and insurance services	381	35,500	291	43,600
Rental, hiring and real estate services	381	9,600	165	9,300
Professional, scientific and technical services	711	38,900	663	52,800
Administrative and support services	342	42,500	435	61,200
Education and training	189	7,800	207	14,500
Health care and social assistance	387	30,800	447	51,200
Arts and recreation services	105	9,600	126	11,400
Other services	69	1,900	159	3,900
Total	7,353	569,800	6,759	641,200

Appendix B: Prevalence index of practices

Table B1: Prevalence index of practices, weighted by firm, 2005-2017

	2005	2009	2013	2017
Strategy - focus				
Strategy - Importance of pricing of goods and services	0.825	0.851	0.868	0.861
Strategy - Importance of quality of goods and services	0.899	0.925	0.934	0.932
Strategy - Importance of flexibility/ability to make changes	0.757	0.790	0.808	0.793
Strategy - Importance of delivery to customers	0.870	0.908	0.911	0.900
Strategy - Importance of innovation	0.657	0.633	0.632	0.648
Focus on existing domestic markets	0.781	0.791	0.817	0.792
Focus on existing export markets	0.149	0.140	0.155	0.146
Focus on new domestic markets	0.515	0.516	0.500	0.479
Focus on new export markets	0.119	0.103	0.118	0.102
Strategy - practices				
Planning horizon for goals	0.551	0.540	0.568	0.577
Goals - formal process	0.285	0.278	0.317	0.322
Goals - incorporate customer requirements	0.643	0.668	0.653	0.610
Goals - incorporate supplier requirements	0.408	0.425	0.425	0.433
Goals - incorporate employee requirements	0.565	0.577	0.584	0.602
Vision for the future	0.590	0.565	0.589	0.616
Promotes company values to employees	0.700	0.715	0.712	0.720
Regular communication regarding plans	0.677	0.693	0.724	0.744
Regular communication regarding goals	0.638	0.655	0.676	0.686
Regular communication regarding major changes	0.776	0.789	0.788	0.814
Regular communication regarding potential improvements	0.817	0.818	0.836	0.848
Supply chain linkages				
Set procedure for customer complaints	0.751	0.773	0.779	0.789
Contact with major customers	0.625	0.640	0.656	0.643
Systematically measure customer satisfaction	0.438	0.433	0.424	0.430
Work with customers to develop or improve products	0.564	0.561	0.563	0.566
Systems for measuring supplier quality	0.397	0.433	0.432	0.422
Work with suppliers to improve processes	0.424	0.426	0.433	0.434
Contact with suppliers	0.458	0.455	0.458	0.449
Staff authority to contact suppliers	0.480	0.479	0.468	0.472
Information - assessment				
Formal information management system	0.793	0.786	0.772	0.781
Regular work to assess achievement of goals	0.583	0.595	0.611	0.601
Assess performance based on financial measures	0.811	0.827	0.818	0.820
Assess performance based on cost measures	0.718	0.757	0.762	0.751
Assess performance based on operational measures	0.581	0.615	0.624	0.621
Assess performance based on quality measures	0.639	0.671	0.665	0.672
Assess performance based on innovation measures	0.435	0.424	0.431	0.423
Assess performance based on human resources	0.561	0.572	0.582	0.601
Information - scanning				
Systematic comparison with NZ firms in same industry	0.429	0.417	0.417	0.399
Systematic comparison with overseas firms in same industry	0.089	0.086	0.081	0.082
Systematic comparison with NZ firms in different industry	0.030	0.020	0.026	0.022
Systematic comparison with overseas firms in different industry	0.006	0.003	0.006	0.004
Monitor competitors goods or services	0.518	0.507	0.499	0.484
Identify risks or opportunities from technology	0.529	0.512	0.523	0.528
Identify risks or opportunities from market conditions	0.659	0.684	0.653	0.623
Identify risks or opportunities from skill availability	0.532	0.513	0.515	0.498
Identify risks or opportunities from competitors	0.565	0.580	0.586	0.535
Identify risks or opportunities from regulations	0.568	0.555	0.571	0.566
Employee practices				
Formally assess employee job satisfaction	0.379	0.388	0.415	0.465
Formal performance reviews	0.417	0.419	0.449	0.504
Pay for performance schemes	0.203	0.183	0.186	0.183
Employees participate in training - any	0.506	0.512	0.439	0.606
Systematic assessment of skill gaps	0.448	0.441	0.461	0.512
Processes to manage health and safety	0.858	0.881	0.858	0.935
Quality and process				
Extent of quality assessment	0.793	0.816	0.817	0.812
Staff encouraged to identify problems	0.806	0.808	0.805	0.809
Staff encouraged to suggest improvements	0.763	0.747	0.752	0.762
Quality management systems certification	0.207	0.196	0.207	0.212
Documented operating processes/systems	0.595	0.628	0.644	0.672
Measures to reduce environmental impact	0.353	0.459	0.460	0.468

Table B2: Prevalence index of practices, weighted by employment, 2005-2017

	2005	2009	2013	2017
Strategy - focus				
Strategy - Importance of pricing of goods and services	0.876	0.889	0.898	0.893
Strategy - Importance of quality of goods and services	0.931	0.952	0.950	0.949
Strategy - Importance of flexibility/ability to make changes	0.798	0.821	0.829	0.823
Strategy - Importance of delivery to customers	0.914	0.937	0.935	0.927
Strategy - Importance of innovation	0.682	0.691	0.698	0.711
Focus on existing domestic markets	0.841	0.856	0.864	0.862
Focus on existing export markets	0.232	0.233	0.249	0.233
Focus on new domestic markets	0.566	0.569	0.572	0.553
Focus on new export markets	0.183	0.164	0.198	0.170
Strategy - practices				
Planning horizon for goals	0.711	0.708	0.725	0.742
Goals - formal process	0.541	0.573	0.595	0.609
Goals - incorporate customer requirements	0.750	0.755	0.755	0.693
Goals - incorporate supplier requirements	0.492	0.511	0.534	0.525
Goals - incorporate employee requirements	0.655	0.653	0.660	0.672
Vision for the future	0.750	0.753	0.774	0.791
Promotes company values to employees	0.763	0.794	0.788	0.804
Regular communication regarding plans	0.736	0.759	0.775	0.795
Regular communication regarding goals	0.737	0.749	0.776	0.780
Regular communication regarding major changes	0.850	0.872	0.863	0.866
Regular communication regarding potential improvements	0.817	0.831	0.853	0.864
Supply chain linkages				
Set procedure for customer complaints	0.850	0.858	0.871	0.865
Contact with major customers	0.618	0.630	0.658	0.661
Systematically measure customer satisfaction	0.561	0.534	0.541	0.545
Work with customers to develop or improve products	0.618	0.603	0.638	0.634
Systems for measuring supplier quality	0.471	0.481	0.481	0.483
Work with suppliers to improve processes	0.508	0.485	0.519	0.496
Contact with suppliers	0.512	0.493	0.502	0.512
Staff authority to contact suppliers	0.530	0.509	0.493	0.515
Information - assessment				
Formal information management system	0.870	0.878	0.871	0.879
Regular work to assess achievement of goals	0.757	0.759	0.777	0.751
Assess performance based on financial measures	0.899	0.914	0.905	0.904
Assess performance based on cost measures	0.833	0.867	0.861	0.855
Assess performance based on operational measures	0.684	0.737	0.724	0.732
Assess performance based on quality measures	0.717	0.755	0.745	0.764
Assess performance based on innovation measures	0.479	0.495	0.507	0.517
Assess performance based on human resources	0.630	0.662	0.657	0.691
Information - scanning				
Systematic comparison with NZ firms in same industry	0.555	0.545	0.562	0.529
Systematic comparison with overseas firms in same industry	0.258	0.297	0.244	0.237
Systematic comparison with NZ firms in different industry	0.054	0.043	0.055	0.074
Systematic comparison with overseas firms in different industry	0.012	0.009	0.026	0.042
Monitor competitors goods or services	0.645	0.648	0.640	0.621
Identify risks or opportunities from technology	0.617	0.626	0.629	0.654
Identify risks or opportunities from market conditions	0.778	0.784	0.778	0.746
Identify risks or opportunities from skill availability	0.625	0.613	0.602	0.497
Identify risks or opportunities from competitors	0.703	0.710	0.712	0.636
Identify risks or opportunities from regulations	0.642	0.643	0.656	0.629
Employee practices				
Formally assess employee job satisfaction	0.487	0.500	0.531	0.542
Formal performance reviews	0.587	0.592	0.611	0.613
Pay for performance schemes	0.331	0.297	0.303	0.296
Employees participate in training - any	0.594	0.574	0.516	0.661
Systematic assessment of skill gaps	0.604	0.613	0.617	0.610
Processes to manage health and safety	0.932	0.947	0.941	0.971
Quality and process				
Extent of quality assessment	0.824	0.835	0.842	0.833
Staff encouraged to identify problems	0.819	0.837	0.829	0.832
Staff encouraged to suggest improvements	0.774	0.781	0.775	0.781
Quality management systems certification	0.373	0.381	0.396	0.399
Documented operating processes/systems	0.791	0.808	0.808	0.828
Measures to reduce environmental impact	0.455	0.586	0.564	0.571

Appendix C: Business Practices module

Table C1: Changes to BOS Business Practices questions

	2005/2009	2013/2017
Q3 (market focus)		
	During the last two financial years, to what extent did this business focus on the following?	During the last two financial years, to what extent did this business focus on the following types of markets?
Q8 (company values)		
	A little amount	A small amount
Q11 (contact with customers)		
	A little amount	A small amount
Q16 (contact with suppliers)		
	A little amount	A small amount
Q20 (focus of perf assessment)		
	A little amount	A small amount
Q23 (identify risks)		
	A little amount	A small amount
	Response categories: Technology; Market conditions; Skill availability; Competitors; Regulations	As prior, but add: Business operations due to natural disasters; Population (eg, aging, ethnicity); Environment (eg, climate, pests)
Q24 (definition of employees)		
	Changes to punctuation and hyphenation across waves	
Q25, Q26, Q27 (job satisfaction, performance reviews, performance pay)		
	Changed from vertical to horizontal arrangement of response options in 2009.	
Q29 (types of training)		
	Response categories: Professional/technical skills; Trade related skills; Management/supervisory skills; Customer service/sales skills; Computer skills; Other job related skills	As prior, but add: Health and safety training
Q32, Q33, Q34 (quality and process, employee input)		
	A little amount	A small amount

Figure C1: Business Operations Survey Module C, 2017

Section C: Business Practices

1 Section C should be completed by the General Manager.

Strategy, goals and planning

2 Mark one oval for each item listed. How important are the following to the strategies of this business?

Please mark ovals like this —

	not at all important	a little important	moderately important	very important	don't know	
pricing of goods and services sold by this business	1	2	3	4	5	C0201
quality of goods and services produced by this business	1	2	3	4	5	C0202
flexibility / ability to make changes	1	2	3	4	5	C0203
delivery of goods and services to customers	1	2	3	4	5	C0204
innovation (improvements to goods, services and processes)	1	2	3	4	5	C0205

3 Mark one oval for each item listed. During the last 2 financial years, to what extent did this business focus on the following types of markets?

	not at all	a little amount	a moderate amount	a great deal	don't know	
existing domestic markets	1	2	3	4	5	C0301
existing export markets	1	2	3	4	5	C0302
new domestic markets	1	2	3	4	5	C0303
new export markets	1	2	3	4	5	C0304

4 Thinking about the goals set for this business, how far ahead does this business plan?

- 1 up to 6 months
- 2 up to a year
- 3 up to 2 years
- 4 more than 2 years
- 5 don't know
- 6 no goals set for this business → go to **7**

C0400

5 Are those goals mainly developed through:

- formal processes — C0501
- informal processes — C0502

6 Mark one oval for each item listed. In developing goals, how often does this business incorporate the requirements of:

	never	sometimes	frequently	always	don't know	
customers	1	2	3	4	5	C0601
suppliers	1	2	3	4	5	C0602
employees	1	2	3	4	5	C0603

7 Does this business have a clear vision or mission for the future (eg a vision statement)?

1 yes

1 no

C0700

8 To what extent does this business promote a set of company values to its employees?

1 not at all

2 a small amount

3 a moderate amount

4 a great deal

5 don't know

C0800

9 Mark one oval for each item listed. Are employees in this business regularly communicated with regarding:

	yes	no	don't know	not applicable	
plans	1	2	3	4	C0901
goals	1	2	3	4	C0902
major changes	1	2	3	4	C0903
potential improvements	1	2	3	4	C0904

Customers

10 Does this business have set procedures (consistent methods that staff know and adhere to) for dealing with customer complaints?

1 yes

2 no

C1000

11 To what extent do staff, other than sales and marketing staff, have contact with major customers?

- 1 not at all
- 2 a small amount
- 3 a moderate amount
- 4 a great deal
- 5 don't know

C1100

12 How often does this business systematically measure customer satisfaction?

- 1 not at all
- 2 less than once a year
- 3 once a year
- 4 twice a year
- 5 more than twice a year
- 6 don't know

C1200

13 How closely does this business work with customers to develop or improve products or services?

- 1 not at all
- 2 not closely
- 3 quite closely
- 4 very closely
- 5 don't know

C1300

Suppliers

14 For how many suppliers does this business have systems in place for measuring the quality of materials, goods or services?

- 1 no suppliers
- 2 some suppliers
- 3 most suppliers
- 4 all suppliers
- 5 don't know

C1400

15 How closely does this business work with suppliers to improve each other's processes?

- 1 not at all
- 2 not closely
- 3 quite closely
- 4 very closely
- 5 don't know

C1500

16 To what extent do non-managerial staff have contact with this business's major suppliers?

- 1 not at all
- 2 a small amount
- 3 a moderate amount
- 4 a great deal
- 5 don't know

C1600

17 When supply problems arise, do this business's non-managerial staff have the authority to contact external suppliers?

- 1 never
- 2 sometimes
- 3 always
- 4 don't know

C1700

Information and benchmarking

18 Does this business have a formal system in place to manage the storing and retrieval of information?

- 1 yes
- 2 no

C1800

19 Is it part of the regular work of one or more people (either staff or outside contractors) to assess whether this business is achieving its goals?

- 1 yes
- 2 no
- 3 not applicable

C1900

20 Mark one oval for each item listed. During the last 2 financial years, to what extent did this business focus on the following when assessing performance?

	not at all	a small amount	a moderate amount	a great deal	don't know	
financial measures (eg profits, returns on investment, sales growth)	1	2	3	4	5	C2001
cost measures (eg on budget, cost per unit of output, inventory cost)	1	2	3	4	5	C2002
operational measures (eg asset utilisation, on-time delivery)	1	2	3	4	5	C2003
quality measures (eg defect rates, customer complaints)	1	2	3	4	5	C2004
innovation measures (eg process innovations, new value added services)	1	2	3	4	5	C2005
human resources (eg job satisfaction, skills development)	1	2	3	4	5	C2006

21 Mark all that apply. During the last 2 financial years, has the performance or processes of this business been compared in a systematic way with:

- 1 businesses in New Zealand and in the same industry C2101
- 2 businesses outside New Zealand and in the same industry C2102
- 3 businesses in New Zealand and in a different industry C2103
- 4 businesses outside New Zealand and in a different industry C2104
- 5 none of the above C2105

22 How closely does this business monitor competitors' goods or services?

- 1 not at all
- 2 not closely
- 3 quite closely
- 4 very closely
- 5 don't know C2200

23 Mark one oval for each item listed. To what extent does this business attempt to identify risks or opportunities arising from changes in:

	not at all	a small amount	a moderate amount	a great deal	don't know	
technology	1	2	3	4	5	C2301
market conditions	1	2	3	4	5	C2302
skill availability	1	2	3	4	5	C2303
competitors	1	2	3	4	5	C2304
regulations	1	2	3	4	5	C2305
business operations due to natural disasters	1	2	3	4	5	C2306
population (eg ageing, ethnicity)	1	2	3	4	5	C2307
environment (eg climate, pests)	1	2	3	4	5	C2308

Employee practices

24 Note: for the following questions, 'employees' includes managerial and executive staff and full-time, part-time or casual employees.

Don't include:
- contractors
- working proprietors

25 Over the last financial year, what percentage of employees in this business had their job satisfaction formally assessed?

zero	15% or less	30% or less	50% or less	51% - 99%	100%	don't know	
1	2	3	4	5	6	7	C2500

26 Over the last financial year, what percentage of employees in this business had formal performance reviews (consistent methods that are recognised and regularly used)?

zero	15% or less	30% or less	50% or less	51% - 99%	100%	don't know
1	2	3	4	5	6	7

C2600

27 What percentage of employees in this business are currently on 'pay for performance' schemes (eg productivity based incentives, profit sharing, bonuses, etc)?

zero	15% or less	30% or less	50% or less	51% - 99%	100%	don't know
1	2	3	4	5	6	7

C2700

28 Over the last financial year, please estimate the percentage of employees in this business who participated in training.

- 1 zero → go to **30**
- 2 25% or less
- 3 50% or less
- 4 75% or less
- 5 76% – 100%
- 6 don't know

C2800

29 Mark one oval for each item listed. Over the last financial year, please estimate the percentage of employees in this business who participated in the following types of training:

	zero	25% or less	50% or less	75% or less	76% - 100%	don't know	
professional / technical skills	1	2	3	4	5	6	C2901
trade related skills	1	2	3	4	5	6	C2902
management / supervisory skills	1	2	3	4	5	6	C2903
customer service / sales skills	1	2	3	4	5	6	C2904
computer skills	1	2	3	4	5	6	C2905
health and safety training	1	2	3	4	5	6	C2906
other job related skills	1	2	3	4	5	6	C2907

30 Does this business undertake systematic assessments of the skill gaps and training needs of its individual employees?

- 1 yes
- 2 no

C3000

31 Does this business have processes in place to manage health and safety (eg inspections, provision of information to staff)?

- 1 yes
- 2 no

C3100

Quality and process

32 To what extent does this business assess the quality of goods or services before they are delivered to customers?

- 1 not at all
- 2 a small amount
- 3 a moderate amount
- 4 a great deal
- 5 don't know

C3200

33 To what extent are non-managerial staff actively encouraged to identify problems in goods, services or processes?

- 1 not at all
- 2 a small amount
- 3 a moderate amount
- 4 a great deal
- 5 don't know

C3300

34 To what extent are non-managerial staff actively encouraged to suggest improvements to goods, services or processes?

- 1 not at all
- 2 a small amount
- 3 a moderate amount
- 4 a great deal
- 5 don't know

C3400

35 Does this business have quality management systems certification (eg industry accreditation, Baldrige quality programme, ISO9000)?

- 1 yes
- 2 no

C3500

36 Does this business document its operating processes / systems?

- 1 yes
- 2 no
- 3 don't know

C3600

37 Does this business have measures in place to reduce its environmental impact (eg recycling, triple bottom line reporting, environmental certification, ISO14000)?

- 1 yes
- 2 no

C3700

Appendix D: Additional practices of interest

This paper has focused on managerial and business practices captured in the BOS, presenting a select set of examples to illustrate the extent , direction, and proximate drivers of practice change in the New Zealand economy. The full set of practices, including decompositions, are available to the reader via the online data appendix https://mbienz.shinyapps.io/management_practices_data_appendix.

This final section considers a small set of additional practices which have changed in prevalence over the past decades and which intersect with policy areas under MBIE's responsibility. For each practice we provide a brief discussion alongside the key statistics: (1) variation in practices over time, across firm size and selected industry groupings; and (2) decomposition of the proximate drivers of change in the aggregate use of each practice into those associated with firm turnover (entry and exit), within-firm changes in practices, and changing sample composition. These additional analyses complement the existing statistics provided in figures 3 and 4, and appendix tables B1 and B2.

The practices covered are based on responses to the following BOS questions:

- Does this business have measures in place to reduce its environmental impact (eg, recycling, triple bottom line reporting, environmental certification, ISO14000)?
- To what extent does this business attempt to identify risks or opportunities arising from changes in technology?
- Does this business have processes in place to manage health and safety (eg, inspections, provision of information to staff)?

Environmental practices

Context

The BOS business practices data captures a period of history in which we have seen a significant change in thinking about the environment in general, and climate change in particular. For New Zealand, alongside commitments made under the Paris Agreement to reduce emissions to 30% below 2005 levels by 2030, this included the passing of the Zero Carbon Act 2019, the establishment of an independent Climate Change Commission, and a goal of achieving net zero emissions by 2050. However, New Zealand continues to have one of the highest levels of emissions per capita in the OECD, with gross emissions remaining roughly constant since 2007 (MBIE 2020b).

Meanwhile, public interest in protecting the environment remains strong across many areas, including water quality and waste, with a 2018 survey by the Ministry for the Environment showing that "reducing waste and its impact on the environment" ranked second after reducing poverty as one of the most important challenges affecting New Zealand over the next 20 years (Ministry for the Environment 2021).

There are many examples of business leading the charge, both in combating climate change and in designing products and systems to mitigate the impacts. Over 100 businesses, from banks to energy providers to manufacturers, have signed up to the Climate Leaders Coalition, with commitments around measuring and reducing emissions, including through working with suppliers to reduce emissions through the supply chain (Climate Leaders Coalition 2021). Meanwhile, smaller businesses have taken steps to reduce their own environmental footprint, through recycling, reducing waste, shifting to low-emission energy sources, as well as developing products to help their customers do the same.[23]

Although the BOS data provides only a very weak indication of the prevalence of environmental measures among New Zealand firms – firms are asked whether they have any measures in place to reduce their environmental impact, which can include measures which are very minor both in absolute and relative terms – the results are indicative that firms are increasingly aware of their environmental impact. More detailed point-in-time data on firms' responses to climate change was collected in Module C of the 2021 Business Operations Survey. This one-off module will provide a breakdown of current and planned actions with respect to both reducing net greenhouse gas emissions and adapting to the changing climatic conditions.

Discussion

Tables B1 and B2 show that over the period 2005-2017 there has been an 11.5 percentage point change in both the share of firms reporting that they have environmental measures in place, and the share of employees working in firms with

[23] See case studies available from https://www.toitu.co.nz/our-members/case-studies, https://www.tools.business.govt.nz/climate/ and https://www.climateleaderscoalition.org.nz/news-and-resources/resources/case-studies for examples.

such measures. Figure D1 shows an increase in uptake across all size groups, concentrated between 2005 and 2009. The overall increase in the number of firms reporting that they have environmental measure in place was fairly equally driven by each of the different sources – within firm uptake, firm entry and exit, and turnover in the survey sample (figure D2) – while the increasing share of employment was driven primarily by uptake among continuing firms and by the exit of incumbents which did not have environmental practices in place in 2005.

In contrast, while changing industry composition has created something of a drag on the prevalence of environmental measures (figure 4), the degree and direction of change has varied across industries and over time (figure D1). Among the selected industries, all but Agriculture, forestry & fishing exhibit an initial rise in the share of both firms, and employment in firms, reporting that they have environmental measures in place. However, while the reported rates in Agriculture, forestry & fishing subsequently recovered, ending the period with a 10 percentage point higher share of firms (5pp higher share of employment) than in the base year of 2005, several other industries saw a reversal of the initial positive moves, at least temporarily. This reversal was particularly noticeable in the employment-weighted results across services industries, including Health care & social assistance which had a lower share of employment in firms with reported environmental measures in 2017 than in 2005, due primarily to the entry of some large firms which did not report having environmental measures in place (within-industry decomposition not shown). This contrasts with the overall finding of strong increases in reported uptake between 2005 and 2017 across most industries.

Figure D1: Variation in practice indices – Environmental measures

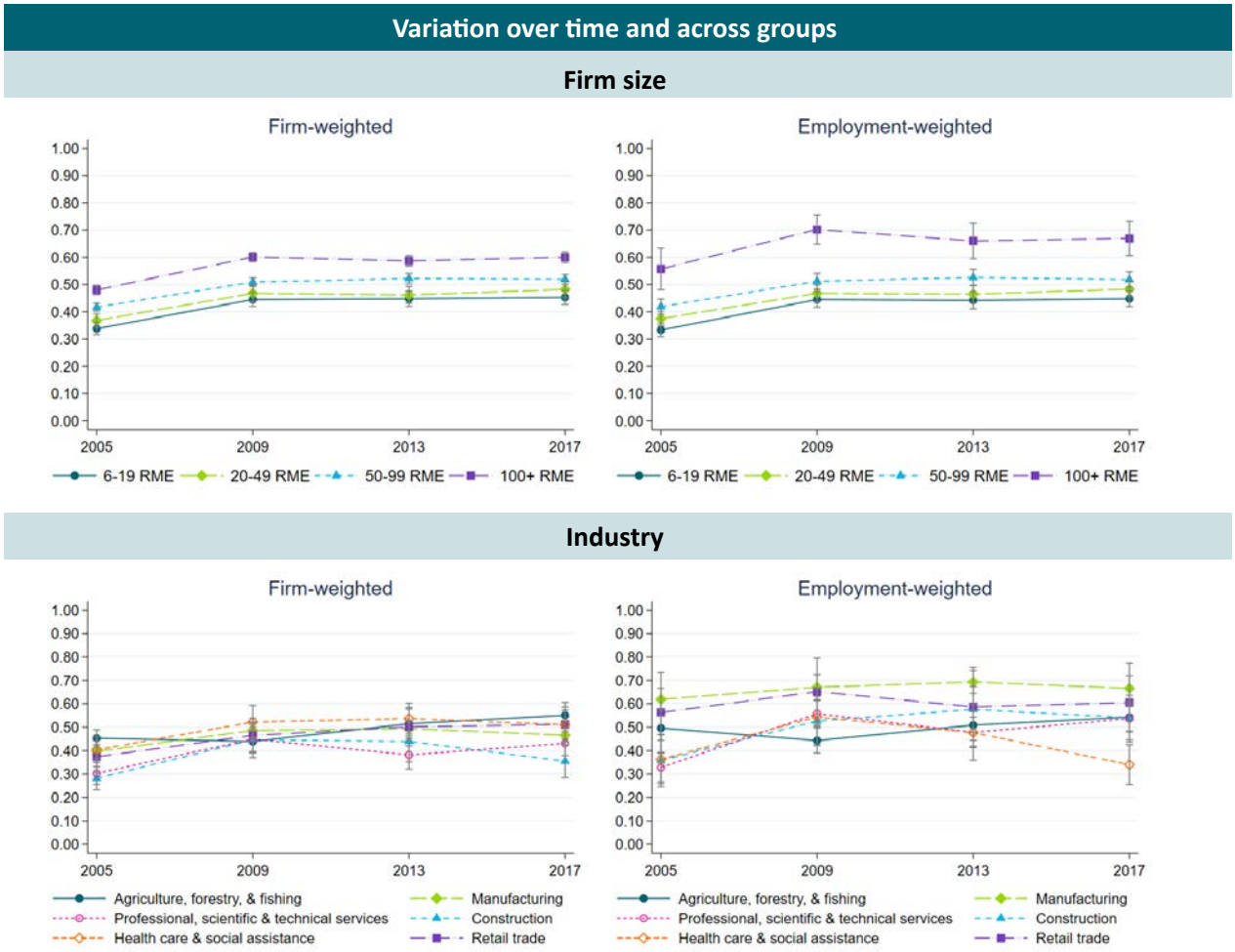
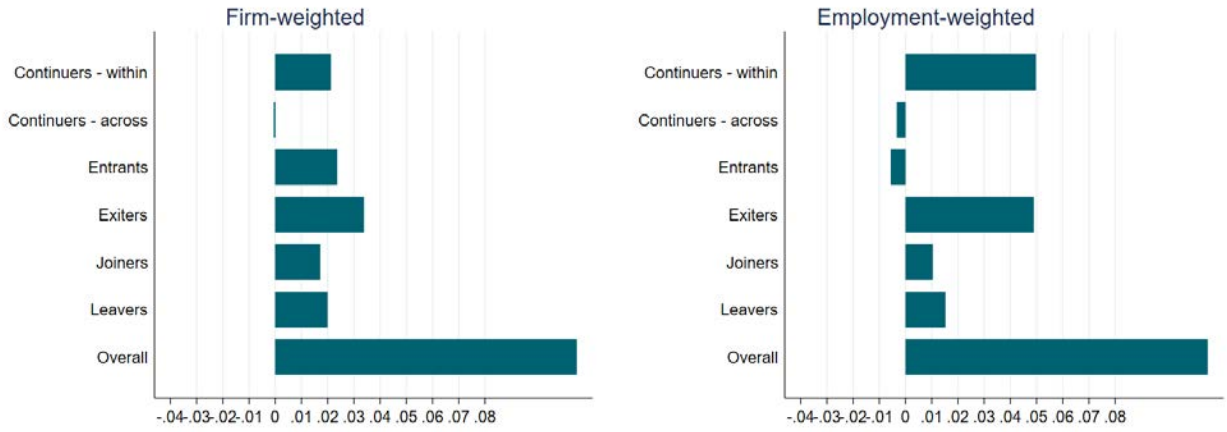


Figure D2: Decomposition by firm dynamics – Environmental measures, 2005-2017



Identifying risks or opportunities from technology

Context

Technology change, and in particular the rapid development and adoption of digital technologies, is reshaping the way firms produce, operate, and interact. Digital tools and technologies such as artificial intelligence, the Internet of Things, and sophisticated use of big data, are creating new ways for firms to generate value. Expanding skills and ready access to cloud computing, online platforms, and social media is widening the base of firms which are able to use technology to their advantage (and sometime to their detriment). At the same time, by reducing the marginal cost of production and increasing the importance of platform and network economies, digital technologies can contribute to a "winner-takes-most" dynamic, encouraging greater concentration of economic activity in a few leading players - the "superstar firms" (Bajgar et al. 2019) .

While digital technologies are a major disruptor almost across the board, specific technologies such as self-driving cars, synthetic biology, and advanced agricultural technologies have the potential to revolutionise particular sectors – whether through enhancing productivity and generating new opportunities, or through replacing activities which are currently performed by humans. By combining digital technologies across physical and digital spheres, this "Fourth Industrial Revolution" is disrupting the status quo for producers and consumers alike, with a pace and complexity which is difficult to comprehend (Schwab 2016). While not yet captured by the BOS business practices data collection, the COVID-19 pandemic has further pushed the boundaries of science and emphasised the need for all businesses to adapt to a fast-changing digital and technological environment.

Discussion

New Zealand firms are far from being disinterested in the opportunities associated with technology. In 2005, around 20 percent of firms and 27 percent of employment was associated with firms which responded "a great deal" to the question on the extent to which they attempt to identify risks or opportunities from technology change, with a further 36 (41) percent of firms (employment) selecting "a moderate amount". However, despite rapid changes in the availability and types of new technologies available, there has not been a substantive increase in the extent to which firms are monitoring the technological environment – at 0.528, the firm-weighted index was the same in 2017 as it had been in 2005 (table B1), while the employment-weighted index increased a little, from 0.617 to 0.654 (table B2).

Figure D3 shows variation across firm size groups and industries, with a mild but noticeable increase in the index among larger (100+ RME) firms and a strong increase observed in Retail trade (perhaps reflecting the rise of online shopping and international sales platforms, with this rise being driven primarily by smaller retailers). While the Professional, scientific & technical services industry also saw a mild increase in the extent to which firms reported that they were monitoring the risks and opportunities of technology change, other selected industries remained largely stable in both the firm

and employment-weighted results. The decomposition in figure D4 again emphasizes that increases were mainly observed in large firms, with only the employment-weighted results showing a positive and significant change over the period. Proximate drivers of this change included increased efforts by continuing firms, and both population and sample exit of firms which had reported relatively low efforts. Perhaps surprisingly, however, the overall index was pulled down somewhat by the birth of new (relatively large) firms which reported below average levels of effort to identify opportunities from technology change.[24]

[24] Although surprising, this pattern is consistent with Allan and Sanderson (2021) who find that technology adoption has had only limited firm-level impacts on employee outcomes to date.

Figure D3: Variation in practice indices – Identify risks or opportunities from technology

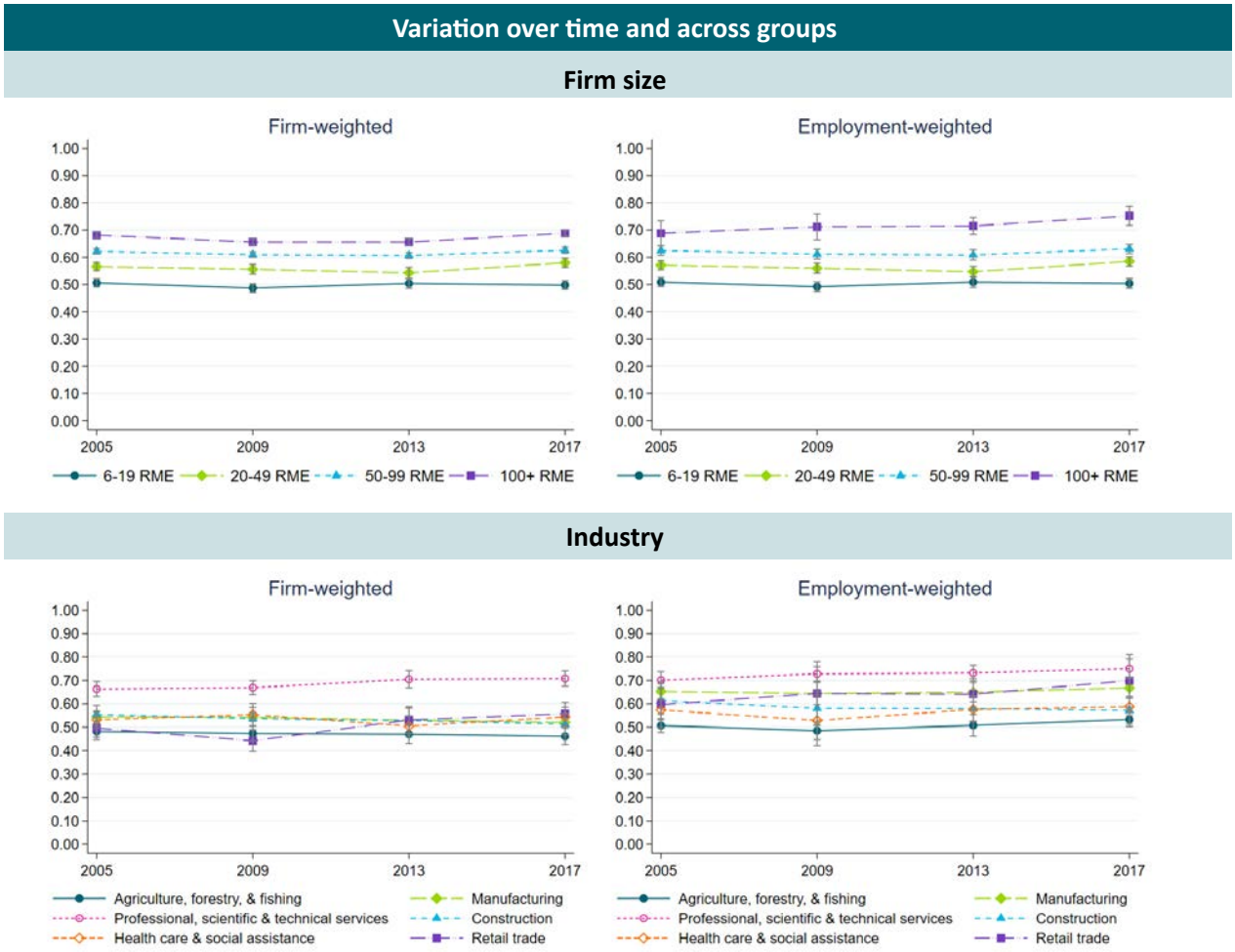
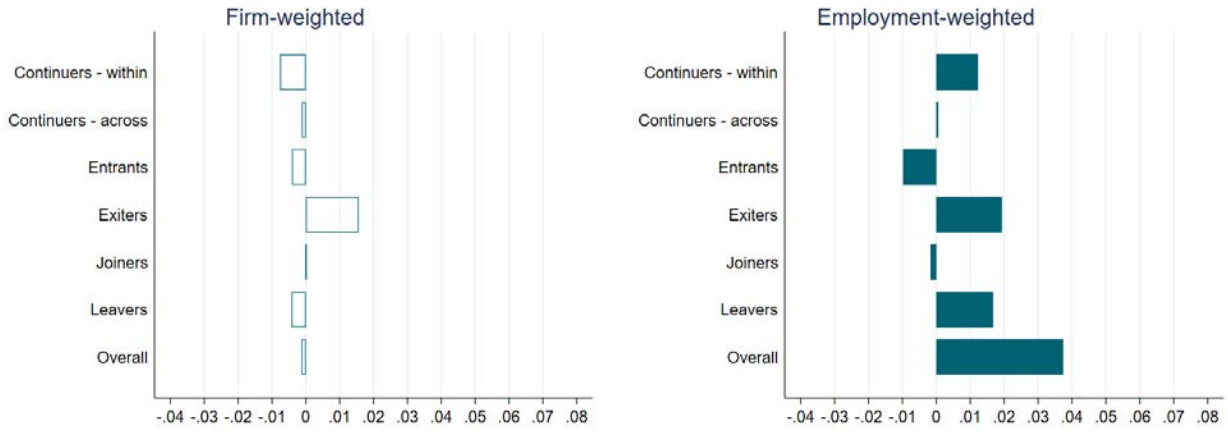


Figure D4: Decomposition by firm dynamics – Identify risks or opportunities from technology, 2005-2017



Processes to manage health and safety

Context

New Zealand continues to suffer from a high burden of work-related harm – both injuries and deaths sustained on the job, and work-related ill-health, such as muscular skeletal disorders and mental health conditions (MBIE 2020a). Reflecting the poor performance of New Zealand relative to comparator countries such as Australia and the UK, and in the wake of the Canterbury Earthquakes and the Pike River mine collapse, the Government established a Health and Safety Review Taskforce in 2012 (New Zealand Government 2012) . The taskforce reported back in 2013, finding that "New Zealand's current health and safety system is not fit for purpose" and putting forward recommendations across three broad areas: accountability, motivation, and knowledge (Independent Taskforce of Workplace Health and Safety 2013). The recommendations of this taskforce led to a wide ranging review of health and safety legislation and the passing of the Health and Safety at Work Act 2015. This Act sets out the rules and responsibilities for businesses and employees to manage and reduce work risks, including requirements for those who create the risk to manage that risk, and requiring businesses to engage with workers and enable them to actively participate in health and safety processes (Worksafe 2021). Falling towards the end of the observation period for management practices, this legislative change, along with the ongoing media attention on workplace accidents, is expected to have affected the extent to which firms actively manage employee health and safety.

Discussion

In contrast to the poor outcomes discussed above, the reported prevalence of processes to manage health and safety was already very high at the beginning of the study period. Around 86 percent of firms, covering 93 percent of employment, reported having health and safety processes in place in 2005 (table B1, B2). This may again be due to the low threshold imposed in the BOS question, which gives examples of "inspections" and "provision of information to staff". The aggregate prevalence remained fairly stable over the following eight years rising to 88 percent of firms in 2009 and 86 percent in 2013 (95 and 94 percent of employment), before rising to 94 percent of firms and 97 percent of employment in the 2017 survey. Thus, despite the already high prevalence, the new Act and the surrounding attention to health and safety measures, appears to have had a noticable effect on uptake.

While uptake is generally high, figure D5 shows a noticeable gap between industries, which appears to be related to the perceived level of physical risk. Professional, scientific & technical services and Retail trade tend to have lower uptake of health and safety measures than the more hands-on industries of Construction, Manufacturing, and Health care & social assistance. On a firm-weighted basis, the largest increase among the selected industries occurred in Agriculture, forestry & fishing, and largely predates the introduction of the new Act, perhaps reflecting ongoing concerns and media attention to the high rate of work-related injury and deaths in this industry (see, eg, Lilley et al.

(2021)). In contrast, the share of firms reporting health and safety processes in place changed little, and indeed deteriorated slightly in Retail trade and Professional, scientific & technical services over the period 2005-2013 before rebounding in the years to 2017.

Comparison of firm-weighted and employment-weighted results in figure D6 suggest that the aggregate change was led mainly by small firms (unsurprising due to the high existing prevalence of health and safety measures in larger firms), with firm dynamics playing an important role alongside a smaller increase in uptake by continuing firms. Firm entry and exit seem to play a particularly large role in Agriculture, forestry & fishing, and in Professional, scientific & technical services, while uptake among continuing (small) firms plays a relatively larger role in Retail trade (graphs not shown for brevity, but available in the online appendix).

Figure D5: Variation in practice indices – Health and safety, all

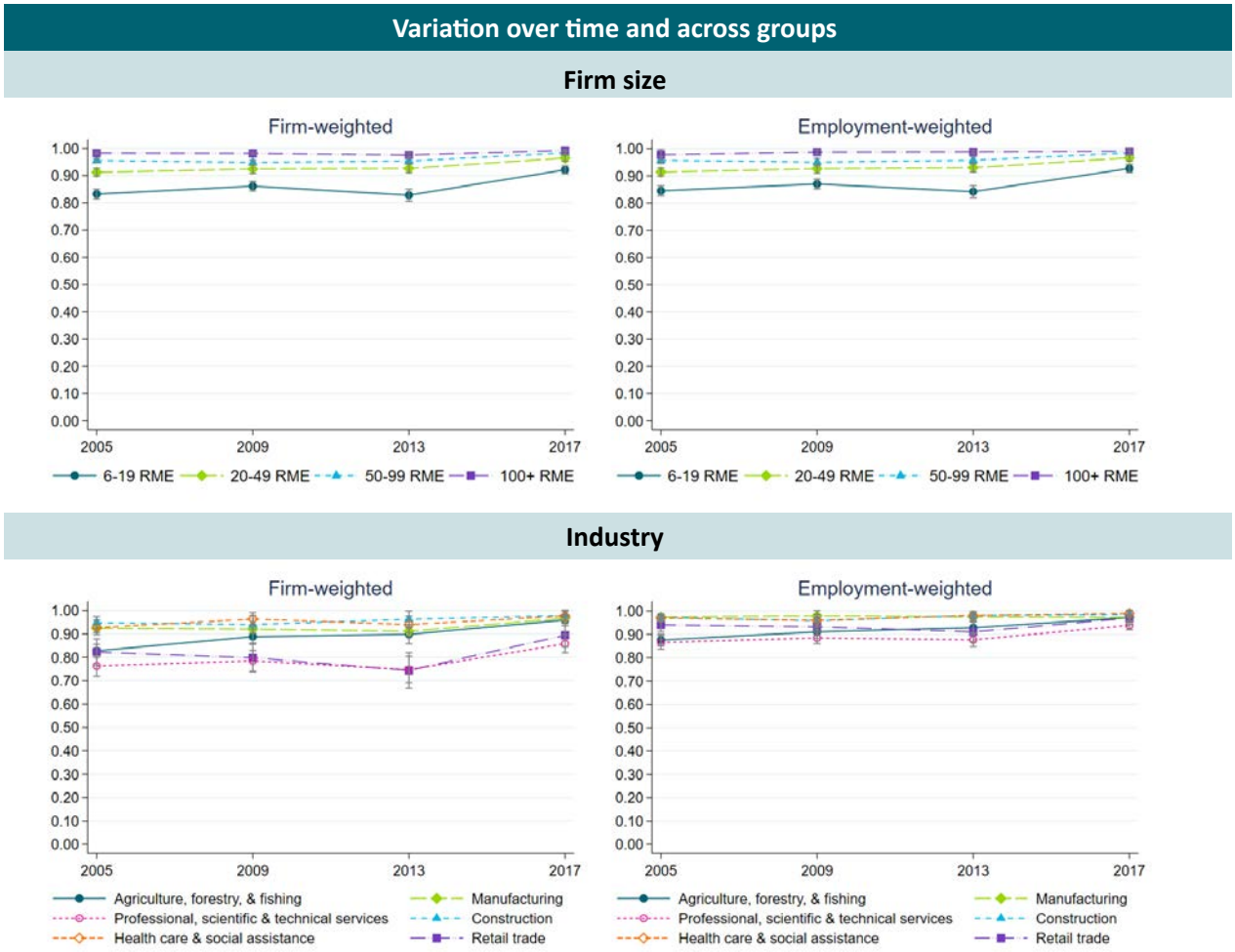
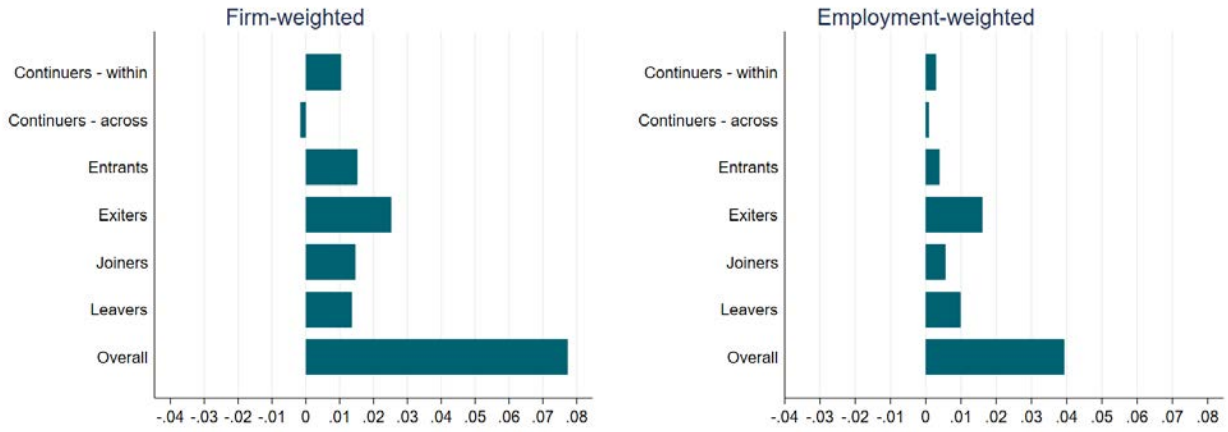


Figure D6: Decomposition by firm dynamics – Health and safety, 2005-2017



New Zealand Government