RECENT DEVELOPMENT OF UK CONSTRUCTION PRODUCTS SECTOR: EVIDENCE FROM MICRODATA

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Construction products sector is an important pillar of the UK economy. Under the UK government's productivity agenda, how to raise the productivity of this sector therefore becomes an issue of significance. Before exploring the productivity drivers of this sector, a systematic understanding of its industry structure is essential. The characterisation of this sector will be shown in this research from different dimensions, average size of enterprise, capital intensity and concentration ratios. These results characterise the features of the constituent industries of construction products sector and can be a useful basis for exploring productivity performance of this sector in the further studies.

Keywords: construction products sector, industry analysis, concentration ratio, capital intensity, productivity

INTRODUCTION

In recent years, improving productivity is upheld as the key to sustainable prosperity in the UK government policy agenda. Construction products sector (CPS) is an important contributor to the UK economy, accounting for approximately 3% of GDP [Chang et al.,2005]. Its activities consists of thirty eight SIC 4-digit industries, ranging from extraction of raw materials, manufacture of building materials and components, to distribution channels and as a result this sector is characterised by the heterogeneity of outputs produced by its constituent industries, leading to distinctive patterns of operation (reflected in average employment, turnover and capital intensity) and market structure (reflected in concentration ratios). In the Structure- Conduct-Performance paradigm of industrial economics, these structural parameters are pivotal factors in shaping the company's competition behaviour and thus performance, for which productivity is one of the important yardsticks. To explore productivity drivers, a systematic grasp of these issues is the essential first step.

The data source of this paper is from the Annual Business Inquiry conducted by the Office for National Statistics. The primary results include: (1) the aggregate scale of CPS and its dispersion in terms of gross output and employment; (2) average size of establishment and capital intensity in each CPS industry; and (3) concentration ratios of each CPS industry. The first result gives an overview of this sector. The second result can tell us about the distinct patters of size distribution across CPS industries, while the last result gives useful summary statistics for market structure in each CPS industry. These "microdata" are more disaggregated than those that can be found in the government publication, providing a foundation for further analysis on the

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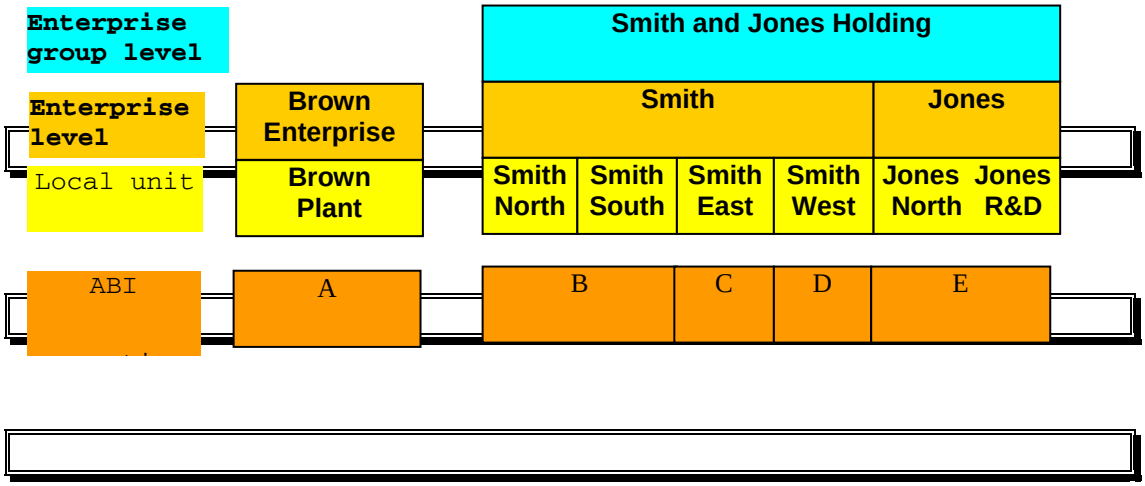
productivity differentials among establishments in the CPS industries. It is published for the first time because these datasets are made available to the researcher until recent years.

STRUCTURE OF THE DOCUMENT

The primary data source this study relies upon is from the Annual Business Inquiry (ABI). This is one of the most comprehensive data collection on business information in the UK, administered by the Office for National Statistics.

It is worth noting that the business entities responding to the ABI may correspond to different levels of business organisation: enterprise group, enterprise and local unit. A good illustration case can be found in Haskel et al. (2004)(see Fig.1). Suppose there are two types of businesses: single-plant establishments and multi-plant establishments. For a single-plant enterprise like Brown, all of its economic activities are reported by one reporting unit A. In contrast, another multi-plant enterprise like Smith and Jones Holding consists of two establishments, Smith and Jones. In the individual enterprise, it may have several local branches. For example, Smith is made up of four geographical units: Smith North, Smith South, Smith East and Smith West. The way these braches are reported in the ABI is up to the enterprise. Each local unit can be a reporting unit such as C and D, or two or more can be combined as a single reporting unit such as B. Sometimes, organizationally an enterprise consists of more than two establishments, but if they are registered in the same address all of its economic activities are reported by one unit, Jones being a case.

Fig.1 Illustration of ABI data structure



Source: Criscuolo et al. (2004)

The ABI takes stratified random sampling from the IDBR, a central register of UK businesses. The total sample size is nearly 74,000, accounting for 50% of total employment in the UK. To reduce compliance costs, the sampling fraction decrease as employment bands, as shown in Table 1. Since 1998, only big establishments with more than 250 employees have to participate the survey every year. The percentage of establishments selected in other size bands ranges from twenty percent to one hundred percent and varies by industry.

Table 1: Sampling fraction of the ABI in different employment size bands

Census year	Employment size band	Sampling Fraction	Comments
1998 onwards	<10 10-99 100-249 250 or more	0.2 0.5 All or <= 0.5 All	Varies by industry

CONSTRUCTION PRODUCTS SECTOR DEFINED

After consulting the construction products association, the UK construction products sector is a term used to describe an assemblage of thirty eight SIC 4-digit industries, as shown in Fig.2. The selection of industries is based on a basic criterion: whether the majority of their output is produced for manufacturing or distributing building materials and components. This sector can be divided by two dimensions:

(1) Types of products: Stone, sand and clay; wood; chemical products; plastic products; other non-metallic products; metallic products; services

(2) Stages of the supply chain: raw materials; intermediate products; final products; distribution

From Fig.2, it is shown that services and manufacturing activities account for forty and sixty percent of employment respectively. The majority of manufacturing activities (55%)[2] are concentrated on the production of metallic and stone products. It is worth noting that for the stone, sand and clay products, there is a complete supply chain from raw materials to distribution. In terms of production stages, nearly half of the activities are located in the provision of final products and forty percent are distribution services.

Table 2 **Comparison of economic characteristics of heavyside and lightside divisions**

	Heavyside	Lightside
Classification criterion	High weight / low value products e.g. aggregates	Low weight/ high value products e.g. boilers
Market served	Plants will supply local / regional markets	Plants will supply national/ international markets
Import/export	Generally relatively low import penetration	Internationally traded and sourced products
Basic type of products	Basic, structural products	Engineered, building services products, internal fittings
Examples	Bricks, cement, concrete building blocks, drainage pipes, gravel, insulation, lintels,	Adhesives, bathroom equipment, electrical wiring accessories, floor and wall tiles, heating equipment, ironmongery, kitchen units, paints, sanitarywares

Resource: adopted from information given by the Construction Products Association

In addition, to insulate the influences of import/export exposure, it is useful to make discussions when appropriate by splitting this sector into three divisions: heavyside, lightside and distribution. The main difference between the first two divisions lies in different characteristics of product. Heavyside products are highly geography dependent, such as concrete, and some are not (see Table 2). Obviously, it has something to do with the ratio of product value to transportation costs. The lower is this ratio, the more economical for the buyer to choose suppliers nearby and thus the more localized is the market. Suppliers serving only local markets are more exposed to cyclical market demand risks. Diversification of risk by expanding operation into distinct geographical areas seems an important driving force for consolidation in.

[2] This number is the ratio of the summated employment share of metallic and stone products (19%+14%) to the total employment share of manufacturing products (60%).

EMPLOYMENT AND TURNOVER

According to the UK business register database IDBR, there were more than thirty thousand establishments operating in Construction Products Sector, providing 622,000 jobs in 2002 and generating more than £68 billion sales. On average, each enterprise had £2 million sales per year and employed 19 people.

Table 3 Employment of the construction products sector

	Number of establishments	Total employment	Total turnover (billion)	Average turnover (million)	Average employment
1998	31,991	600,409	62	1.93	18.8
1999	32,132	597,846	62	1.93	18.6
2000	31,991	595,079	61	1.90	18.6
2001	32,010	624,894	64	1.99	19.5
2002	32,284	622,412	68	2.12	19.3

In terms of firm size, the dispersions in the sector have not changed significantly. Dispersion is measured by comparing the 90th percentile with the 10th percentile. The greater this ratio the wider the dispersion. Table 3 shows that the 90th percentile is much greater than the 10th percentile, with roughly 25 times in employment and 53 times in turnover. Table 4 also shows that the dispersion amongst large and medium establishments (p90/50) is greater than that between medium and small ones (p50/10).

Table 4 Spread of total employment in the construction products sector

	Employment			Turnover		
	p90/10	p90/50	p50/10	p90/10	p90/50	p50/10
1998	25	6.25	4	54.87	**9.25**	5.93
1999	24	6	4	52.08	9.54	5.46
2000	24	6	4	52.90	9.65	5.48
2001	27	6.75	4	53.42	9.69	5.51
2002	27	6.75	4	53.20	9.64	5.52

Fig 3 Employment and turnover in three divisions

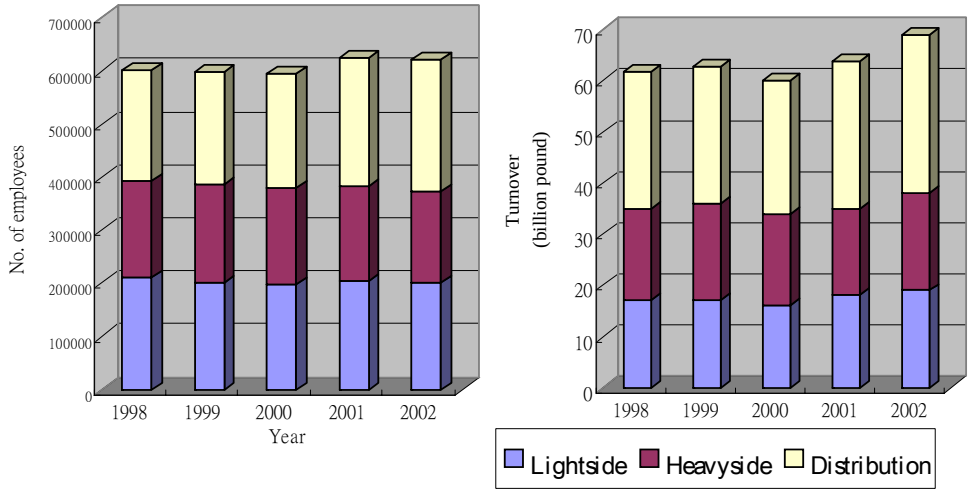
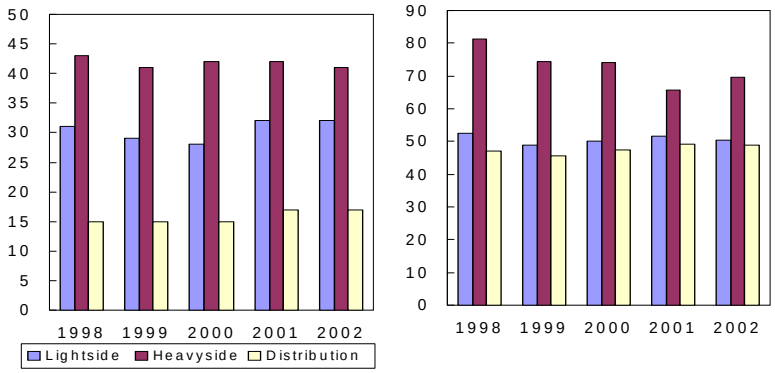


Figure 3 analyses employment at the divisional level. This shows that heavyside and lightside are stable in terms of both employment and turnover, while distribution has slightly expanded, accounting for 40 percent of employment and 45 percent of total sectoral turnover in 2002.

Fig.4 shows the spread of employment and turnover (measured by p90/10) in the three divisions. The greatest divide between large and small establishments is in the heavyside division. Lightside comes next and distribution has the least dispersion.

Fig 4 Spread of employment and turnover in three divisions



WHAT SCALE ARE ESTABLISHMENTS IN EACH INDUSTRY?

Average employment and turnover provide two ways of looking at the average scale of operations in different SIC 4-digit industries. Figure 5 shows average employment[3] varies sharply within industries. The average employment per enterprise in three industries (Manufacture of flat glass [2611], Manufacture of ceramic sanitary fixtures [2622], Manufacture of concrete products [2661]) is higher than 100. In contrast some industries, including Quarrying of stone [1411], Manufacture of builder's carpentry and joinery [2030], Cutting, shaping and finishing of stone [2670] and Agents involved in the sales of timber and building materials [5113]), have average employment levels of less than 10. Figure 6 illustrates a similar pattern when average turnover is used as scale measure.

Fig 5 Average employment per enterprise in the SIC 4-digit industries

[3] Average employment here means the average of average employment for each year

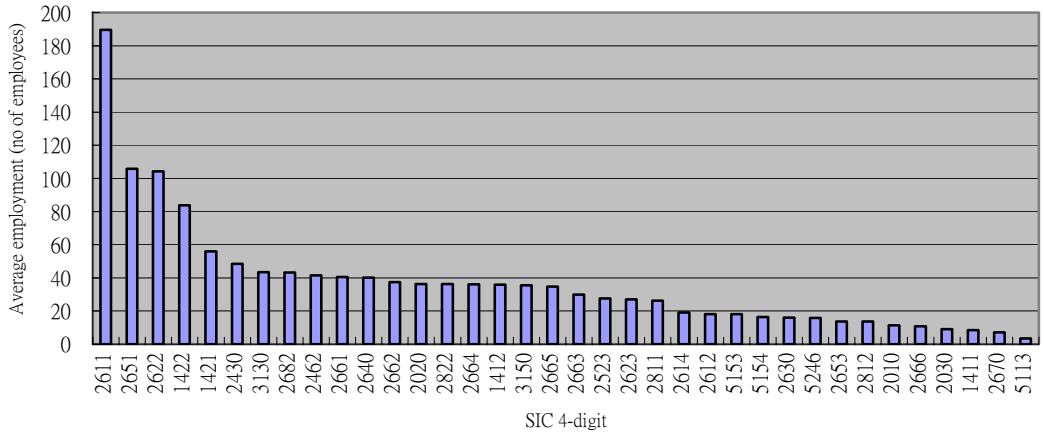
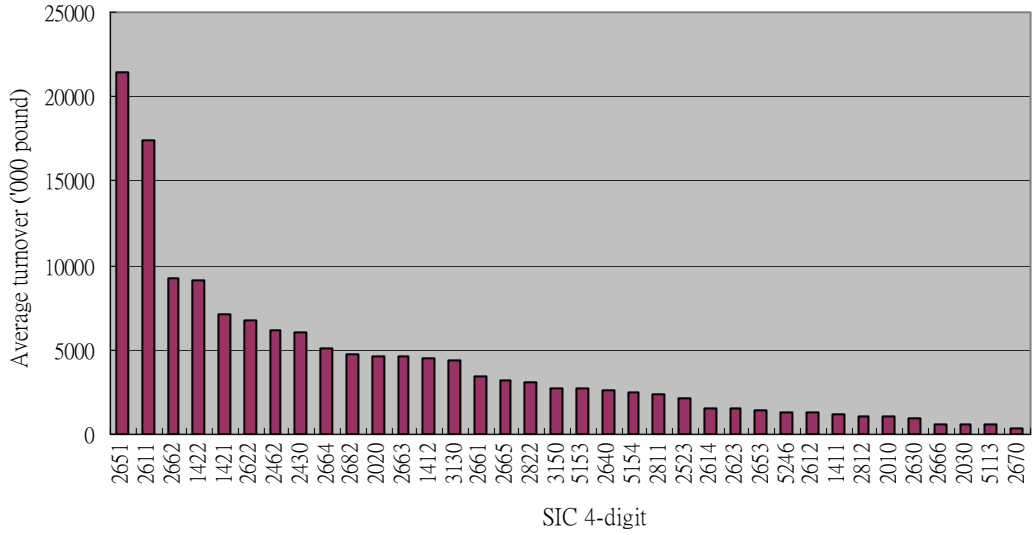


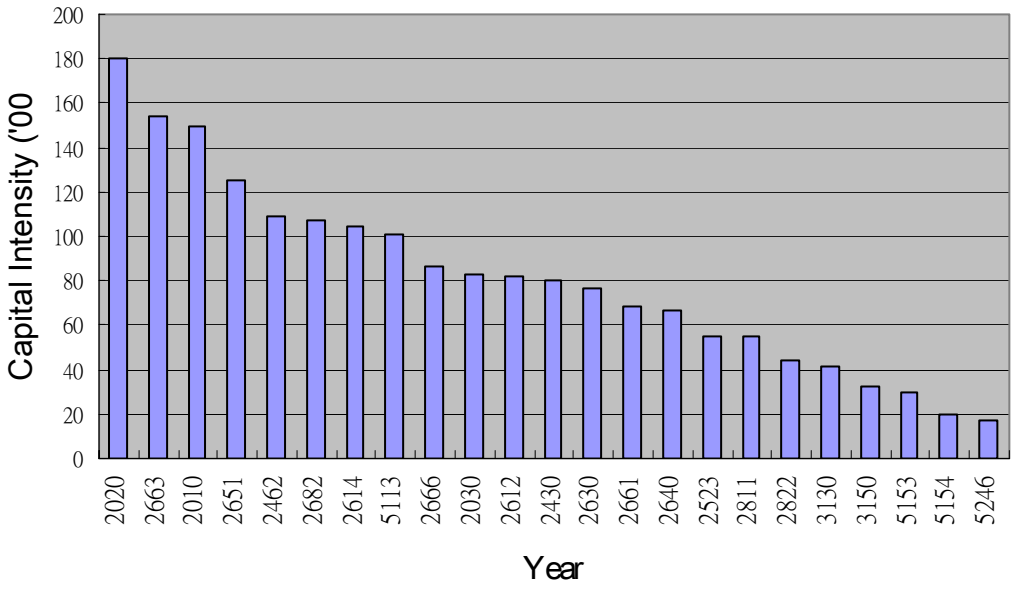
Fig 6 Average turnover per enterprise in the SIC 4-digit industries



WHICH INDUSTRIES USE CAPITAL MORE INTENSIVELY?

Apart from labour, another important input is capital, such as machinery, plant and buildings. The intensive use of capital is often associated with a reduction in workforce, which in turn raises the value each worker can create. The degree of capital intensity is measured by the ratio of total capital employed to total workforce in different industries. Figure 7 clearly shows that Saw milling of wood [2010], Manufacture of veneer sheets, plywood and fibre board [2020] and Manufacture of ready-mixed concrete [2663] use capital most intensively. It is worth noting that heavyside industries do not necessarily have higher capital intensity. Some lightside industries, such as Manufacture of glues and gelatine [2462], are also capital intensive.

Fig 7 Capital intensity in the 4-digit industries



INDUSTRY CONCENTRATION

A commonly used measure of industry structure is the concentration ratio, which tracks how concentrated market shares are. Figure 8 shows the average concentration ratios in the 4-digit industries, by plotting the % of market share held by the five largest firms in each 4-digit industry. In six industries the five largest firms hold more than 90% market share (Manufacture of flat glass [2611], Manufacture of ceramic sanitary fixtures [2622], Manufacture of cement [2651], Manufacture of plaster [2653], Manufacture of plaster products [2662] and Manufacture of mortars [2664]). In other industries the largest five establishments hold as little as 12% market share. Clearly these data refer only to UK firms and take no account of global market shares.

Fig 8 Concentration ratios (CR5) in 4-digit industries

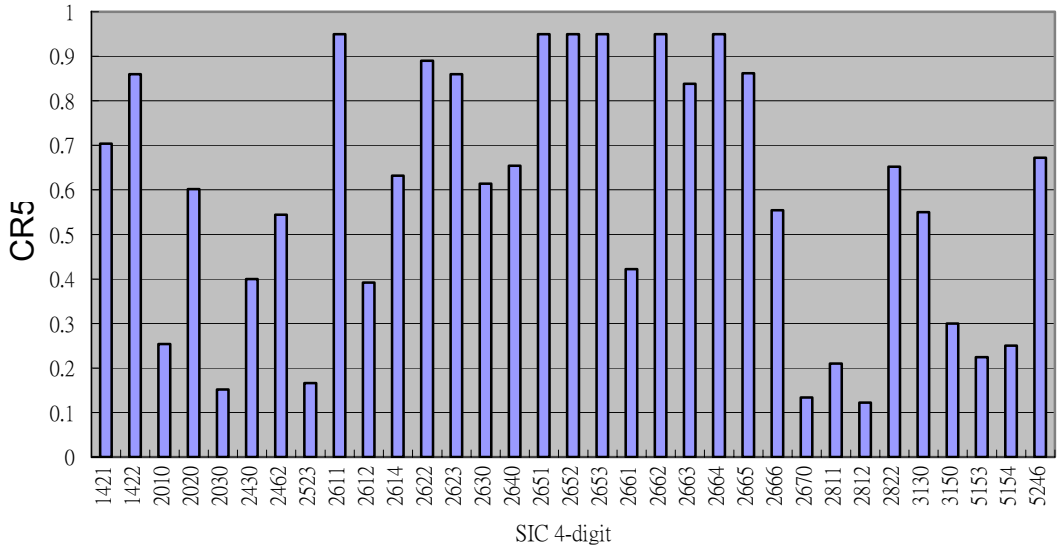
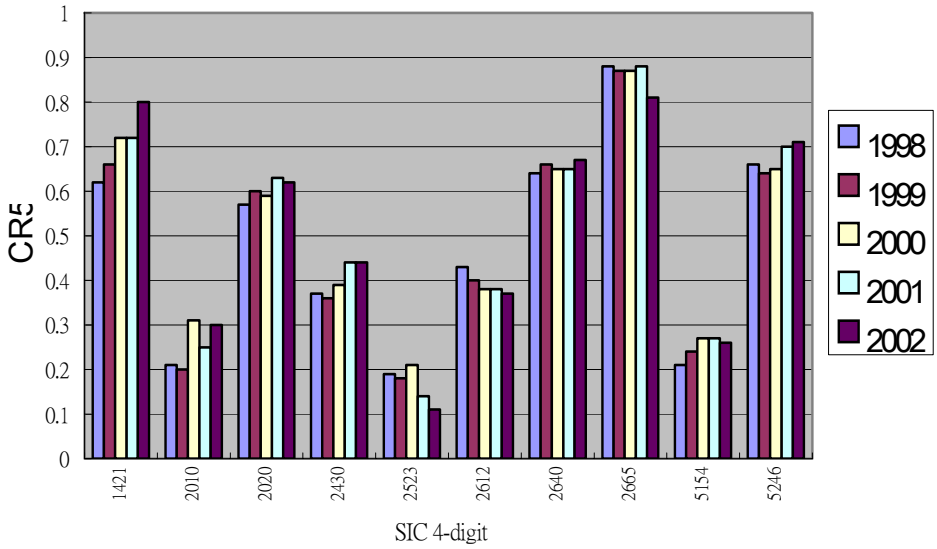


Fig 9 Time series of concentration ratios (CR5) in 4-digit industries where CR5 has changed



As shown in Fig.9, during the time period under study, the concentration ratios in the Manufacture of builders' ware of plastic [2523], Shaping and processing of flat glass [2612] and Manufacture of fibre cement [2665] have become more dispersed, while seven industries have become more concentrated. The industry making the most noticeable change is Quarrying of gravel and sand pits [1421]. Generally speaking, overall changes are rather small.

DISCUSSION

The ABI dataset is a powerful source to explore the evolving path of economic activities in the UK. To my knowledge, this research is the first work attempting to investigate the basic industry characteristics of the UK construction products sector based on this data source. The result presented here is able to provide an overview picture of this sector from different dimensions, including the factors critical to the

analysis of productivity, such as capital intensity and industry concentration. It also lays a foundation for a fuller economics analysis of this sector.

CONCLUSION

Construction products sector is made up of thirty eight SIC 4 digit industries with total turnover of 62 billion and employment of 0.6 million in 2002, of which 40% is contributed by service part of this sector . During the period of 1998 to 2002, the spread of size in this sector, measured by the difference in employment between the 90th and the 10th percentile establishments, has been on the rise, indicating the large establishments grew faster. Among three divisions, the heavyside has the largest divide between large and small establishments. The second characteristic of industry structure, capital intensity, is found to vary widely. The top three industries using capital most intensively (capital per worker) are Saw milling of wood [2010], Manufacture of veneer sheets, plywood and fibre board [2020] and Manufacture of ready-mixed concrete [2663]. Finally, in terms of the level of concentration ratio, six industries are very concentrated where the five largest establishments account for more than 90% market share. It is also found ten industries have experienced noticeable changes in concentration over the time period studied. These results characterise the features of the constituent industries of construction products sector and can be a useful basis for exploring productivity performance of this sector in the further studies.

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