

CHAPTER 14

A Survey of Micro-data Analyses in Australia

MARN-HEONG WONG

Lee Kuan Yew School of Public Policy
National University of Singapore

There has been a steady increase in studies on firm behaviour and performance in Australia using large-scale micro datasets since the 1990s. This paper reviews these micro-data analyses, with a focus on findings related to the theme of globalisation and firm performance.

A major data source for these studies was the Business Longitudinal Survey panel dataset that covered a four-year period in the mid 1990s. The topics explored have ranged from the determinants of innovation and export performance to productivity determinants such as the use of information technology and enterprise bargaining.

There were few studies that specifically explored the impact of globalisation on firm productivity, but a number of papers examined relevant aspects of firms' international activities and productivity performance. There were also studies where variables of international integration were included in the analyses even though they were not the central research questions.

The findings yielded by these studies were interesting but at the same time, diverse. They highlight the need for more comprehensive research that is focused on the linkages between globalisation and productivity, so that firmer conclusions of their relationships could be derived.

The most likely data source for any new work in this area is the Business Longitudinal Database (BLD) currently being developed by the Australian Bureau of Statistics. The initial release of the BLD is expected in July 2009. While the BLD promises to be a valuable resource, it also has some limitations. Within the constraints of the BLD, potential topics for priority research can include the link between exporting and productivity, and the impact of economic integration on firm dynamics and resource reallocation.

1. Introduction

There has been a steady build-up of studies on firm behaviour and performance in Australia using large-scale micro datasets since the 1990s. The topics explored have ranged from the determinants of innovation and export performance, growth paths of small and medium enterprises, to productivity determinants such as the use of information technology, enterprise bargaining, innovation, research and development and capital investments. The most commonly used measure of performance was labour productivity. There were also occasional constructions of total factor productivity indices or the use of firm profitability as a performance indicator.

The aim of this paper is to provide an extensive survey of micro-data analyses in Australia, with a focus on findings related to the impact of globalisation (or economic integration) on corporate activities and performance.

The paper is organised as follows. The next section describes the main data sources that have been used for firm-level studies and gives examples of some of the issues that have been investigated. Section 3 reviews in detail studies related to aspects of firms' international activities and productivity performance that fall within the framework for analysing the linkages between globalisation and aggregate productivity enhancements. Section 4 discusses the latest developments in data collection and data access and suggests potential topics of priority research interest in that context. Section 5 concludes.

2. Main Data Sources and Related Studies

Researchers who have carried out studies on larger-scale firm-level datasets have turned to three sources. These are the Business Longitudinal Survey (BLS) conducted by the Australian Bureau of Statistics (ABS), the Australian Workplace Industrial Relations Survey (AWIRS) undertaken by the Department of Industrial Relations (now the Department of Education, Employment and Workplace Relations), and the private-sector IBISWorld database.

These datasets are defined by a few characteristics. Firstly, they have quite comprehensive industry coverage. They contain data across a range of manufacturing and services industries, which is unlike many international micro-datasets where data are collected for the manufacturing sector only. Secondly, the unit of data collection is a firm, not a plant. Thirdly, depending on the specific dataset or access conditions, the dataset can contain data on both small and medium firms and large firms, or only one of the two size categories. Lastly, on the time dimension, only the BLS is a longitudinal database that tracks firm entry and exit.

This section describes each dataset and gives examples of research work that has been conducted using these data. More emphasis is given to describing the BLS and related studies, as a significant body of micro-data analyses in Australia, including many of those reviewed in Section 3, have used the BLS.

2.1. Business Longitudinal Survey

The BLS collected data on an unbalanced panel of around 5700 firms over a four year period from 1994-95 to 1997-98. Survey respondents were management units, defined as the highest level accounting unit within a business for which detailed accounts are maintained (ABS, 2000). In nearly all cases this coincided with the legal ownership entity, although larger diversified businesses might have several management units organised along different lines of business. Each management unit was classified according to the industry that provided its major source of income. Thus, management units generally can be regarded as akin to firms, rather than plants.

The BLS covered only non-agricultural market sectors – that is, mining, manufacturing and a range of services industries - and excluded industries with heavy government involvement, such as health, education and communications services. The BLS was primarily designed to collect data on the growth and performance of small and medium enterprises (SMEs), although data on large firms were collected to allow population estimates. The publicly available dataset (the Confidentialised Unit Record File, or CURF) contains data on SMEs with less than 200 employees only (henceforth termed the ‘SME sample’). The full sample (the Main Unit Record File, MURF) has restricted access.

Each survey included a set of core questions, which were asked each year and a set of one-off questions addressing different policy issues each year. The core questions included employment, ownership, union membership, export status, business practice, financial structure and information in the balance sheet. The specific topics covered were innovation and training (1994-95); labour turnover and business links (1995-96); use of computers (1996-97) and internet use, health and safety practices and training (1997-98).

Businesses were chosen from the ABS Business Register based on the stratified random sampling method, where the stratification was by both industry and employment size classification. From the first phase of 13000 firms, 9000 live responses were collected. These were further stratified into two categories in 1995-96: firms identified as innovators, exporters, or those with high employment or sales growth, which numbered about 3400, continued to be surveyed; of the remaining 5600 live respondents, about 2200 were selected for inclusion in the survey. In addition, a random sample of new firms, or births, was selected for the 1995-96 survey. In subsequent years, all firms surveyed in the previous year were traced, with exits recorded, and births included.

Studies using the BLS are a mix of descriptive exploration of firm characteristics and formal econometric analyses (see Parham (2002) for a selected list for both types of papers). BLS data have been employed to examine topics ranging from innovation, export performance, employment changes, enterprise bargaining to ICT usage – some of them in conjunction with firms' productivity performance. Thus, BLS-related research can broadly be grouped into non-productivity and productivity related studies. The former group has investigated issues such as the growth paths of SMEs (for example, McMahon, 2001; Jones 2004) and determinants of innovation (for example, Battacharya and Bloch 2004; Rogers 2004a). The latter group has examined productivity determinants such as enterprise bargaining, ICT use, innovation and R&D and capital investments (for example, Loundes, Tseng and Wooden 2003; Gretton and Gali 2004). The majority of these papers use labour productivity measure. Where they make use of the panel nature of the data, a balanced panel is typically employed, and both fixed effects and random effects estimators have been used in different papers.

2.2. Australian Workplace Industrial Relations Survey

The AWIRS was carried out in 1990 and 1995. The main survey had a sample of around 2000 workplaces with 20 or more employees. Workplaces were selected from all industries except Agriculture, forestry and fishing and Defence. AWIRS 95 was a larger and more complex survey than AWIRS 90, as it included a panel survey of 698 workplaces sampled in 1990 and an employee survey.

AWIRS data is useful for studies on the determinants of labour productivity. Loundes (1999) investigated a range of determinants on labour productivity level and growth using AWIRS 95, covering indicators of industrial relations, economic incentives for employees, and workplace characteristics. The role of market competition on managerial incentives and productivity were explored in Blanchflower and Machin (1996) and Rogers (2004b).

2.3. IBISWorld Database

The IBIS database contains annual financial and operations information on medium to large firms in Australia across all ANZSIC divisions, from 1979 to the present. This includes data on the top 2000 companies at any time, ranked by turnover. The data are collated from a variety of sources, such as published accounts, the Australian Stock Exchange and surveys. While the IBIS database allows for panel data analysis, it does not track the entry and exit of firms.

The IBIS database is more often used for studies on firm profitability. The book edited by Dawkins, Harris and King (1999) comprises a series of articles on the performance of big business in Australia based largely on the IBIS database, with topics ranging from factors affecting profitability, such as R&D and management principles, to the costs of monopoly and public policy. IBIS data have also been linked to data on intellectual property from IP Australia for research on innovation and R&D issues (for example, Bosworth and Rogers, 2001).

3. Survey of Literature Related to Globalization and Productivity

3.1. Papers Examining Globalisation and its Impact on Firm Productivity

As far as can be ascertained, there were two earlier papers among Australian firm-level studies that specifically examined globalisation and its impact on businesses' productivity performance. These were: Ergas and Wright (1994) on the extent of Australia's international integration, pattern of resource allocation between industries, and the effect of integration on firms' learning, product quality and variety and productivity; and Bloch and McDonald (2001) on how import competition interacted with domestic competition to affect labour productivity level and growth.

Ergas and Wright (1994) analysed the issue using new data from a survey of Australian manufacturers carried out by the ABS on behalf of the Australian Manufacturing Council (AMC). The survey was conducted over December/January 1993/1994 on firms with more than 20 employees. A total of 962 firms responded to the survey, which was equivalent to over 10 percent of the population. The survey contained over 100 questions, many of them involving scalar judgements. The authors tested several hypotheses that were organised around the main argument that integration led to more intense product-market competition which then changed firm conduct and performance. They examined responses to particular questions, reviewed data plots and estimated separate probit equations for the dependent variables of product quality, relative unit costs and export orientation against explanatory variables. Ergas and Wright found that the factors that most sharply distinguished the better performing firms were investment in intangible assets (mainly skills and R&D), less conflictual industrial relations, and a more systematic emphasis on monitoring their performance relative to rivals. These factors seemed to hinge on the international orientation of firms, which determined their exposure to, and willingness and ability to learn from, world best practices.

Bloch and McDonald (2001) studied the impact of import competition on labour productivity. They used a panel dataset of large manufacturing firms with at least \$20 million market capitalisation classified at the 2-digit industry level. Two panels were drawn from the IBIS database, the first a balanced panel comprising 265 firms over the

period 1984 to 1993, the second a balanced panel of 434 firms for the period 1988 to 1993. The authors derived expressions for productivity level and productivity growth that allowed for imperfect competition, in the mode of Hall (1988), and both the markup and technology index were treated as functions of competition. Fixed effects estimations were carried out with the variables both in levels and first differences, on sub-samples of firms in industries with high and low industry concentration respectively. The study's key finding was that import competition interacted with domestic competition in influencing productivity level and growth, with the positive impact of increased exposure to import competition rising with the degree of concentration among the domestic producers. Lowering border protection on manufactured imports into Australia had led to enhanced productivity from domestic producers, especially those in highly concentrated industries.

3.2. Papers Examining Aspects of Firms' International Activities or Productivity

Other relevant work focused on particular aspects of firms' international activities or productivity performance. Firms' exporting behaviour, including possible selection in exporting, was covered in Revesz and Lattimore (2001) and Gabbitas and Gretton (2003). A Productivity Commission (2002) paper reported on findings from a survey on offshore investment by Australian firms.

Gabbitas and Gretton (2003) explored the influences of firm size and the magnitude of firms' domestic sales base on the export performance of firms from the full sample of the BLS. The econometric analysis focused on the manufacturing sector, with a sample of over 1500 firms. Two types of regression analysis were conducted. The first was logit regressions which looked at the influence of firm size on the likelihood of firms exporting, the likelihood of firms being regular exporters and the likelihood of exporting firms being regular exporters. The second was fixed effects panel estimation to analyse the relationship between firm size and the level and intensity of exporting. Gabbitas and Gretton found that while many significant exporters also happened to be larger firms, the results did not support the proposition that a firm first had to secure a large domestic sales base in order to compete effectively in export markets. The study suggested that the main determinants of export performance were a range of firm-

specific factors, including product design and quality, marketing expertise and motivation of management.

Revesz and Lattimore (2001) examined the use and impact of some major export facilitation programmes, as well as R&D programmes on Australian firms in trade oriented or R&D intensive sectors. A sample of 1848 firms in the mining, manufacturing, engineering services and computer services sectors were drawn from the BLS full sample. Various regression techniques were used in the analysis, such as logit regressions for participation and transitions and ordinary least squares for labour productivity growth. The study found that only one of a number of export facilitation programmes had a significant effect on the export growth of participants. However, the authors cautioned that the estimates might be imprecise because of the failure to adequately correct for the bias that arose from the self-selection by firms with high export growth to participate in these programmes. The study also found no apparent link between productivity growth and participation in government business programmes, although the authors qualified that 'noise' in the productivity data and other methodological problems might partly explain the results.

A Productivity Commission (2002) paper reported on the findings from a survey conducted in September 2001 of 201 of Australia's largest firms on their offshore investment activities. The paper was descriptive with no econometric analysis. However, given the lack of firm-level studies on Australian FDI, it is nevertheless interesting to highlight some of the key findings. Nearly half of the respondents had offshore direct investment. Of these respondents, 85 percent reported that all or some of their offshore operations were similar to core operations in Australia, indicating that there was a substantial degree of horizontal integration between the Australian and offshore operations of those firms. New Zealand and the Asian region were the most common locations of offshore operations. Commercial factors were much more important than government-related factors in influencing firms to invest offshore. Of these, international market access was the dominant commercial factor, while foreign and domestic tax regimes were leading government-related influences. Only a third of the firms with offshore investment ranked gains from skills and technology in new operating environments as being of moderate to high importance. The impact of offshore operations on firm profits was mixed. Half of the firms reported an increase in

profits, one third indicated no change, while 15 percent indicated that their offshore operations had been a drain on their domestic operations.

3.2.1. Decomposition Analyses

Another strand in the framework for the analysis of globalisation and firm performance is the role of firm dynamics (entry, exit and changing market shares) and resource reallocation in affecting aggregate productivity growth. Trade liberalisation and deregulation is hypothesised to encourage competition and new technology adoption, which would facilitate the contraction and exit of low-productivity firms and the expansion and entry of high-productivity firms. The resulting reallocation of resources from low- to high-productivity firms raises average industry productivity.

There have been several decomposition analyses of employment and productivity using BLS data, although none has yet explicitly explored the association between firm dynamics, resource reallocation and economic integration. Breunig and Wong (2007) carried out productivity decomposition for 2-digit ANZSIC (Australia and New Zealand Standard Industrial Classification) manufacturing and service industries and highlighted the importance of firm dynamics in contributing to Australia's productivity growth. Bland and Will (2001) decomposed the contribution of continuing, entering and exiting firms to productivity growth at the 1-digit ANZSIC level, while Juniper, Mitchell and Myers (2004) examined the rates of job creation and job destruction.

Breunig and Wong (2007) carried out total factor productivity (TFP) decomposition for 25 and 23 manufacturing and service industries at the 2-digit ANZSIC level using the BLS full sample and SME sample respectively. Firm-level TFP indices were constructed from production function estimates that incorporated firm-specific productivity differences and endogenised firm exit decisions, following Olley and Pakes (1996)¹. Aggregate productivity for each 2-digit industry was then obtained as the sum of firm-level TFP weighted by each firm's share of industry value added.

¹ See Breunig and Wong (2005) for detail of the estimation technique and Breunig and Wong (2008) for the detailed regression results and more information about the data.

The decomposition method used was an extension to a method proposed by Fox (2004) (termed the ‘extended-Fox decomposition’), as follows:

$$\begin{aligned} \Delta P_{0,1} = & \sum_{i \in C} \theta_{i0} \Delta P_{i1} + \sum_{i \in C} \left(\frac{1}{2}\right) \Delta \theta_{i1} \Delta P_{i1} - \sum_{n \in C} \left(\frac{1}{2}\right) \Delta \theta_{i1}(a) \\ & + \sum_{i \in N} \left(\frac{1}{2}\right) \theta_{i1} (P_{i1} - a) - \sum_{i \in X} \left(\frac{1}{2}\right) \theta_{i0} (P_{i0} - a) \end{aligned} \quad (1)$$

where $\Delta P_{0,1}$ is the growth of industry TFP between periods 0 and 1; θ_i is the output share of firm i , P_i is each firm’s productivity level, and a is a scaling factor, which is the average aggregate productivity level between the two periods in this formulation. i indexes individual firms in C, N and X, which are the sets of continuing, entering and exiting firms, respectively. The five terms on the right hand side represent, in order, the fractions of industry productivity change attributable to ‘within-firm’ changes, ‘between-firm’ cross effects, ‘pure share’ changes, entry and exit.

This decomposition method was a new formulation, and differed from commonly applied decompositions. See elaboration in Box 1.

Results from the extended-Fox decompositions underscored the importance of firm dynamics as a key factor behind changes in Australian industries’ TFP performances in the mid-1990s. The between-firm cross effect was positive in nearly all industries, that is, activities had shifted rationally from incumbents with low productivity growth to those with high productivity growth. Many of the industries also had a positive net entry effect. This arose more from the positive impact of firms with below average industry productivity exiting the market, as entrants on the learning curve were more likely to contribute negatively to TFP change in the first few years following entry. In contrast to the reallocation terms, the contribution from within-firm productivity change was negative in over half of the instances. In several industries, especially in the SME sample, overall TFP gain was due entirely to firm dynamics, as the within-firm component was negative. Where industries experiencing TFP growth enjoyed both positive intra-firm and inter-firm contributions, the share of inter-firm reallocation usually was significant. Positive reallocation terms were also important in offsetting negative within-firm effects in industries registering TFP decreases.

Box 1. Issues with Conventional Decomposition Methods

The decomposition method used in Breunig and Wong (2007) is a new formulation that corrects for a problem with the conventional measure of aggregate productivity change in firm-level studies, namely, that it captures a mixture of productivity and market share changes, instead of solely the former. This problem was highlighted in Fox (2004) and the elaboration is as follows: aggregate productivity growth between periods 0 and 1 is conventionally computed as:

$$\Delta P_{0,1}^A = \sum \theta_{i1} P_{i1} - \sum \theta_{i0} P_{i0} \quad (2)$$

The formulation above suffers from a fundamental problem in aggregation, which is the failure to satisfy the basic property of monotonicity. Even if all firms experience an increase in productivity, aggregate productivity can fall. The reason is that the output shares are not held constant in going between periods 0 and 1, and hence quantity changes are confounded with share movements. If this measure is interpreted as one of 'pure' productivity change, which is the case in most studies, analysis is potentially misleading.

The use of an average period share for the aggregate productivity-change indicator will resolve the aggregation problem. This requires applying a Bennet (1920) indicator, as suggested in Fox:

$$\Delta P_{0,1}^B = \sum_{i \in I} (1/2)(\theta_{i1} + \theta_{i0}) \Delta P_{i1} \quad (3)$$

To demonstrate the interpretation problem associated with the use of $\Delta P_{0,1}^A$ in Equation 2, Fox (2004) further defined an aggregate share-change indicator in a similar vein to the aggregate Bennet productivity-change indicator in (3):

$$\Delta S_{0,1}^B = \sum_{i \in I} (1/2)(P_{i1} + P_{i0}) \Delta \theta_{i1} \quad (4)$$

and noted that

$$\Delta P_{0,1}^A = \sum \theta_{i1} P_{i1} - \sum \theta_{i0} P_{i0} = \Delta P_{0,1}^B + \Delta S_{0,1}^B \quad (5)$$

From Equation (5), it is clear that interpreting $\Delta P_{0,1}^A$ as a pure productivity change is flawed in that it erroneously conflates productivity and share changes.

The results in Breunig and Wong (2007) contrast with the findings in the only other productivity decomposition study on Australian firms using the BLS SME sample by Bland and Will (2001). Bland and Will had decomposed the average labour productivity change of six 1-digit divisional ANZSIC industries using an earlier decomposition method, so the two studies admittedly are not comparable. Nevertheless, it is interesting to note their conclusion that continuing firms accounted for the bulk of the productivity changes, with the within-firm effect dominating the contribution. They found a generally negative relationship between resource movements and productivity change, as firms that experienced increased labour productivity shed employment. Net 'true' entry effect was negative in half of the six industries studied, and where positive, the net entry effect was relatively small. One point Bland and Will made that was consistent with the observation in Breunig and Wong (2007) was that both departing firms and entrants tended to have lower than average (labour) productivity.

Juniper, Mitchell and Myers (2004) examined the link between firm size and the rates of job creation and job destruction, using the BLS SME sample. They also studied the impact of industrial relations factors on employment generation by small businesses. They reported that larger firms had higher job creation rates and lower job destruction rates in 1997-98. The rate of job creation was 24 percent for the smallest firms (with 1-19 employees) and 51 percent for the largest firms (150 – 200 employees). The rates of job destruction in order of increasing firm size were 8.0 to 1.5 percent. This pattern differed from other studies (for example, Davis, Haltiwanger and Schuh 1996), which observed that smaller plants had both high job creation and high job destruction rates. Juniper et al. also found that of the 'industrial' variables of wage rates, awards coverage, number of unions and percentage of workers compensation and employers' contribution to superannuation of total expenses, there was only the suggestion that greater number of unions in the workplace might retard job creation. However, all of the industrial variables were statistically significant and negatively signed in the regressions on the rate of job destruction. Thus, they concluded that their findings did not support the notion that industrial reforms would assist SME job creation.

3.3. Papers that Included Variables of International Integration

Some studies explored other likely determinants of productivity performance as their central research questions, but included variables measuring firms' export status and/or share of foreign ownership in their regression analyses. Their findings could also shed light on the link between economic integration and business performance. Some examples are given below.

Wong, Page, Abello and Pang (2007) explored the association between innovation and productivity performance using firm-level data that linked the 2003 Innovation Survey to financial data from the ABS' Economic Activity Survey and the Australian Tax Office from 2001-02 to 2004-05. Three sets of equations were estimated using various econometric techniques that included probit and OLS. These were (i) an innovation input equation on the determinants of innovation intensity (share of innovation expenditure in total sales), (ii) four equations that related innovation input to different measures of innovation output, and (iii) productivity equations that examined the relationship between the innovation outputs of product, process and organisational innovations and productivity growth and level. Foreign ownership dummy variables of whether a business had more than 50 percent foreign ownership were included in all the equations. The innovation input equation also included a variable on whether innovation investment was driven by a motive to increase export opportunities. It was found that firms that were driven to increase export opportunities were more likely to engage in innovation activities, while ownership structure did not seem to make a difference to firms' innovation investment decisions. On the link between foreign ownership and various productivity measures, there was some evidence that majority foreign-owned firms were associated with higher labour productivity growth, in particular for small firms. The study also found that the coefficient estimate on majority foreign-owned firms was significant and positive in the total factor productivity level equation, but not in the labour productivity level equation.

Bosworth and Loundes (2002) investigated the interaction of discretionary investments (R&D, capital investment, training and advertising), innovation, productivity and profitability in a dynamic and closed model of firm performance, using a balanced panel of the BLS SME sample. The productivity and profitability equations were estimated using a random effects estimator. The equations included an indicator

of whether a firm exported or not. This variable was not statistically significant in the productivity equation, compared with variables such as investments in intangible assets, availability of business plan, union density and firm age. Coefficient estimate on the export variable was likewise not significant in the profitability equation.

Roger and Tseng (2000) carried out a cross-sectional study on the determinants of labour productivity for manufacturing firms in the BLS full sample in 1996-97. Export status (whether a firm exported in 1997) and foreign ownership (whether a firm has more than 50 percent foreign ownership in 1997) were included as explanatory variables. Sub-sample OLS regressions were conducted for nine manufacturing industries at the 2-digit industry classification level. Both the export and foreign ownership variables did not seem to have a strongly positive relationship with labour productivity, with coefficient estimates on the variables separately statistically significant in only one of the nine industries.

4. Data Sources and Potential Topics for Future Research

4.1. Business Longitudinal Database

The ABS is currently developing a Business Longitudinal Database (BLD), and the first iteration was in 2004-05. The initial release of the BLD is expected in July 2009, and this is the most likely data source for any intended work to examine the relationship between economic integration and performance for Australian firms. As such, this section provides an elaboration of the BLD's key features. More detail can be obtained from the ABS' Discussion Paper, "The first iteration of the Business Longitudinal Database" (2007).

The BLD aims to produce a longitudinal dataset of both characteristics and financial data. It comprises data on organisational characteristics and activities of business from the annual Business Characteristics Survey (BCS), financial data from the Australian Tax Office as well as data on exports and imports from the Australian Customs Service.

The BLD contains a selection of small and medium sized businesses across different industries. For reasons of confidentiality or difficulty in accurately matching characteristics data with financial data for groups of businesses, certain types of businesses or all businesses classified to certain industries have been excluded from the BLD. These include government enterprises, large businesses (that is, with employment of 200 or more), businesses with complex structures, and businesses in industries such as electricity, gas and water supply, finance and insurance, education, and health and community services.

The BLD is made up of overlapping panels of businesses. A panel comprises around 3,000 businesses and a new panel commences each year. Businesses selected into a panel remain in the survey for 5 years. When the BLD is fully populated, there will be five consecutive panels of businesses, totalling approximately 12,000 live businesses, included at all times.

Business characteristics data obtained from the BCS are an important component of the BLD. Each year the BCS will contain a consistent set of core questions. In alternate years, the survey will also contain additional detailed questions relating to either business use of information technology or business innovation. Core questions are organised under several broad themes. The themes and some examples of the specific data collected are as follows:

- *Business demographics*: industry in which business operates, age, percentage of foreign ownership.
- *Workforce compositions*: workforce size, part-time and full-time employees, proportion of permanent to casual staff, employee pay and condition arrangements, staff commencement and cessation.
- *Business operations*: business management arrangements, practices relating to planning or business monitoring, whether a business exported or imported, access to finance.
- *Markets and competition*: characteristics of main customers, extent and nature of competition, estimate of market share.
- *Innovation and research and development*: whether different types of innovations were introduced: new goods or services, operational processes,

organisational/managerial processes. (Information on the presence and scale of R&D activity undertaken by businesses in the BLD will be sourced from the ABS R&D Survey from 2005-06.)

- *Information technology use*: extent of IT use in various processes, type of Internet connection, whether orders were placed and received over the Internet.

The ABS has stated that the main purpose of the BLD is to facilitate longitudinal analyses of business performance. There are however several limitations of the BLD in its current form. The first is that the BLD contains data for small and medium businesses only, which precludes any analysis of, and comparison with the behaviour of large businesses. Policy implications also cannot be drawn for the business population. The second relates to the quality of any productivity measure that can be constructed for analysis. The conversion of nominal output and intermediate input measures to real measures will pose a challenge as price information are not collected at the firm level, and industry price deflators are not available at a sufficiently disaggregated level. This is particularly so for services industries, where price deflators are available only at the 1-digit or at most 2-digit aggregate level. Any measure of capital services inputs is also likely to be crude given the currently available items for its construction, which are non-current assets with no breakdown by asset type, depreciation and capital expenditure. These are limitations that the ABS has acknowledged but are unlikely to resolve in the near term despite ongoing efforts to address them.

4.2. Access to BLD and Development of a Business Census Dataset

The expected initial release of the BLD will be in the form of a Confidentialised Unit Record File (CURF), covering some 9000 firms. Characteristics data are from 2004-05 to 2006-07, while financial data is a longer series that starts from 2002-03. There are three modes of access to CURFs, with increasing levels of data detail as follows: CD-ROM, ABS Remote Access Data Laboratory (RADL) and ABS Site Data Laboratory. The BLD CURFs are likely to be accessible through the RADL, which is an online database query system.

An even richer database is potentially available in the future, and that is the business census dataset that the ABS is developing. This dataset will integrate all

available data for all businesses. This will include core financial data from taxation records or ABS surveys, merchandise trade data, data from ABS Surveys such as R&D Survey and Venture Capital Survey, and any other available administrative datasets. However, in the immediate term, the BLD is the most feasible and accessible data source. Data requirements beyond what is covered in the BLD would require exploration of options with the ABS.

4.3. Potential Research Topics

Given that the BLD contains relatively extensive information on trade, innovation and information technology use, a specific topic related to firm globalisation that can be analysed using the BLD is the link between exporting and productivity. Two alternative but not mutually exclusive hypotheses can be examined. The first is whether more productive firms self select into export markets. The second is whether exporters become more productive, that is, the ‘learning-by-exporting’ hypothesis. Although there have been a number of studies on this issue internationally, such a study has not been conducted on Australian data. It is difficult to carry out studies that aim to explore in detail issues of inward and outward foreign direct investment, as the only relevant variable in the BLD is the percentage of foreign ownership of a business operating in Australia.

Another potential research topic is to examine the extent to which firm dynamics and resource reallocation are linked to the hypothesized underlying factors of greater economic integration and increased competition. This extended work on decomposition analyses could be carried out using the decomposition method that was applied in Breunig and Wong (2007).

There are other topics of interest that would benefit from more research using microdata. Some of these studies might require data that are unavailable in the BLD and these data would have to be obtained from other sources such as customized data from the ABS or through independent surveys. One topic is Australia’s economic integration with its trading partners through free trade agreements (FTAs). The establishment of FTAs has become an integral part of Australia’s trade policy in the 2000s. Presently, Australia has FTAs with Singapore, Thailand, the United States and Chile, the last one entering into force in March 2009. An FTA between ASEAN, Australia and New

Zealand was concluded in August 2008, and FTAs with China, Japan and Malaysia are among those under negotiation. Researchers have undertaken simulations using the GTAP (Global Trade Analysis Project) model to assess the welfare effects of Australia's involvement in FTAs. Siriwardana (2006) analyzed various current and potential FTAs and suggested that Australia was likely to gain more from FTAs with countries that had higher trade barriers prior to negotiating FTAs. Siriwardana and Yang (2008) assessed specifically an Australia-China FTA and projected benefits for both Australia and China, with the former gaining more. Where data permit, this issue can be studied using alternative empirical techniques.

Australia's economic relations with its neighbour New Zealand can be another issue of focus. The two countries have a Closer Economic Relations (CER) agreement since 1983. Petersen and Gounder (2002) examined various trade indicators and found that trade complementarity between the two countries increased after the initiation of the FTA, which was likely due to increased specialization of Australia and New Zealand's resources along the lines of comparative advantage. The results indicated Australia gained competitiveness in some primary and some manufactured products while New Zealand gained competitiveness in most primary products but lost competitiveness in most manufactured products relative to Australia over the 1985-1995 period. A study from New Zealand's perspective by Sandrey and van Seventer (2004) of bilateral trade flows at the SITC5 product level found that between 1988 and 2003, New Zealand had widened its export base to Australia beyond the widening of its trade with the rest of the world. The authors identified the CER as a likely factor that had brought this about. Since Statistics New Zealand also produces micro data on business operations, there is potential to combine Australian and New Zealand micro data for further analyses of their economic interactions.

Another potential research area is Australia's international activities in the mining sector, especially in light of intensified interests from Chinese investors in recent months. A study by consulting company OVUM (2003) had examined the use of Information and Communications Technology (ICT) by mining companies, the relationship between Australian miners and Australian ICT providers both domestically and overseas and the prospects for export opportunities for mining ICT providers. A

new study on the mining industry could approach it from the perspective of geographical dispersion and performance effects.

5. Concluding Remarks

This paper reviews micro-data analyses in Australia, with a focus on findings that are related to the theme of globalisation and productivity. Micro-level econometric studies have increased steadily since the 1990s, and a major data source was the Business Longitudinal Survey, which was a panel dataset covering four years in the mid-1990s.

There were few studies that specifically explored the impact of globalisation on performance, but they generally found that internationally oriented firms or import competition was associated with better productivity performance. A number of papers examined aspects of firms' international activities, specifically on their export and offshore investment behaviour. Among the papers' findings were the following: the main determinants of export performance were firm-specific factors rather than a large domestic sales base; few major government export facilitation programmes had a significant effect on the export growth of participants; and Australian firms invest offshore mainly to access international markets and less so for access to skills and technology.

Another strand in the literature on globalisation and firm performance is the role of firm dynamics and resource reallocation in affecting aggregate productivity growth. There had been several decomposition analyses of employment and productivity using BLS data. In particular, Breunig and Wong (2007), using a new decomposition method, highlighted the importance of firm dynamics as a key factor behind changes in Australian industries' TFP performances in the mid-1990s.

There were also studies that examined other likely productivity determinants as the main research question but included export status or foreign ownership variables in their regression analyses. The studies reviewed here generally yielded coefficient estimates on the export and/or foreign ownership variables that were either statistically

insignificant or not strongly significant. These results could be due to various reasons, such as estimation methods and data quality issues. Where the coefficient estimates on other factors were significant, they might also indicate that export orientation and degree of foreign ownership comparatively were not strong and immediate influences on productivity performance.

It can be seen from the summary above that the survey of relevant studies has yielded a set of diverse and interesting results. At the same time, it highlights the relative paucity of comprehensive studies on the linkages between economic integration and business performance that can enable the derivation of firmer conclusions on the dynamics involved. This points to the need for more work in this area. The most likely data source for this kind of analysis is the Business Longitudinal Database that will have its initial release in July this year, covering data from 2004-05 to 2006-07. While the BLD holds much promise, it also has several limitations. Within the constraints of the BLD, potential topics for priority research can include the link between exporting and productivity, as well as the impact of economic integration on firm dynamics and resource reallocation, which then influences aggregate productivity growth. Other topics of interest include Australia's economic integration with its trading partners through FTAs, economic relations with New Zealand, and international activities in the mining sector. However, these studies might require data beyond what are available in the BLD.

References

- ABS (Australian Bureau of Statistics) (2000). *Business Longitudinal Survey Confidentialised Unit Record File*, Cat. no. **8141.0.30.001**, AGPS, Canberra.
- ABS (2007_). *The First Iteration of the Business Longitudinal Database, Australia, 2004-05*, Discussion Paper, Cat. no. **8164.0**, ABS, Canberra.
- Bhattacharya, M. and Bloch, H. (2004). 'Determinants of Innovation', *Small Business Economics* **22**(2):155-62.
- Blanchflower, D., and Machin S. (1996). *Product Market Competition, wages and productivity: international evidence from establishment-level data*, Discussion Paper 286, Centre for Economic Performance.
- Bland, S. and Will, L. (2001). *Resource Movements and Labour Productivity, an Australian Illustration: 1994-95 to 1997-98*, Productivity Commission Staff Research Paper, March, AusInfo, Canberra.
- Bloch, H. and McDonald, J.T. (2001). 'Import Competition and Labor Productivity', *Journal of Industry, Competition and Trade* **1**(3):301-309.
- Bosworth, D. and Loundes, J. (2002). *The Dynamic Performance of Australian Enterprises*, Working Paper 3/02, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.
- Bosworth, D. and Rogers, M. (2001). 'Market Value, R&D and Intellectual Property: An Empirical Analysis of Large Australian Firms', *Economic Record*, **77**(239): 323-337.
- Breunig, R. and Wong, M-H. (2005). 'Estimation of Total Factor Productivity', in *Quantitative Tools for Microeconomic Policy Analysis*, Productivity Commission Conference Proceedings, 17-18 November 2004, Canberra.
- Breunig, R. (2007). 'The Role of Firm Dynamics in Australia's Productivity Growth', *Australian Economic Review*, **40**(1): 90-6.
- Breunig, R. (2008). 'A Richer Understanding of Australia's Productivity Performance in the 1990s: Improved Estimates Based upon Firm-Level Panel Data', *Economic Record*, **84**(265): 157-176.
- Dawkins, P., Harris, M.S. and King, S. (1999). *How Big Business Performs: Private Performance and Public Policy*, St Leonards, Allen and Unwin.
- Davis, S.J., Haltiwanger, J.C. and Schuh, S. (1996). *Job Creation and Destruction*, MIT Press, Cambridge and London.
- Ergas, H. and Wright, M. (1994). 'Internationalisation, Firm Conduct and Productivity' in P. Lowe and J. Dwyer (eds), *International Integration of the Australian Economy: Proceedings of a Conference Held at the H C Coombs Centre for Financial Studies, Kirribilli on 11/12 July 1994*, Reserve Bank of Australia, Economic Group, Sydney: 51-105.

- Fox, K.J. (2004). *Problems with (Dis)Aggregating Productivity, and Another Productivity Paradox*, Working Paper, University of New South Wales, Centre for Applied Economics Research and School of Economics.
- Gabbitas, O. and Gretton, P. (2003). *Firm Size and Export Performance: Some Empirical Evidence*, Productivity Commission Staff Research Paper, Canberra.
- Gretton, P. and Gali, J. (2004). *Effects of ICT Use on the Performance of Australian Firms: Evidence from a Business Longitudinal Data Set*, Paper presented at the Asia Pacific Productivity Conference, 14-16 July, The University of Queensland.
- Jones, J. (2004). 'Training and Development, and Business Growth: A Study of Australian Manufacturing Small-Medium Sized Enterprises', *Asia Pacific Journal of Human Resources* **42**(1):96-121.
- Juniper, J., Mitchell, W. and Myers, J. (2004). 'Small Business Employment Dynamics in Australia' in E. Carlson (ed), *A Future That Works*, University of Newcastle, Centre of Full Employment and Equity, Callaghan, NSW: 239-251.
- Hall, R.E. (1988). 'The Relation between Price and Marginal Cost in U.S. Industry', *Journal of Political Economy* **96**(5):912-947.
- Loundes, J., Tseng, Y.-P. and Wooden, M. (2003). 'Enterprise Bargaining and Productivity in Australia: What Do We Know?' *Economic Record* **79**(245):245-58.
- McMahon, R.G.P. (2001). 'Growth, Exporting and Innovation in Manufacturing SMEs: Evidence from Australia's Business Longitudinal Survey', *Small Enterprise Research* **9**(1).
- Olley, G.S. and Pakes, A. (1996). 'The Dynamics of Productivity in the Telecommunications Equipment Industry', *Econometrica* **64**(6):1263-97.
- OVUM (2003). *The Australian Mining and ICT Industries: Productivity and Growth*, A Report to the National Office for the Information Economy and the Department of Communications, Information Technology and the Arts.
- Parham, D. (2002). *The Role of Entry and Exit in Australian Productivity Growth*, STI Working Paper 2002/6, OECD, Paris.
- Petersen, E. H. and Gounder, R. (2002). *Closer Economic Relations between Australia and New Zealand: Specialisation, Competitiveness, Complementarity*, Working Paper, East Asian Bureau of Economic Research.
- Productivity Commission (PC) (2002). *Offshore Investment by Australian Firms: Survey Evidence*, Commission Research Paper, AusInfo, Canberra.
- Revesz, J. and Lattimore, R. (2001). *Statistical Analysis of the Use and Impact of Government Business Programs*, Productivity Commission Staff Research Paper, Canberra.
- Rogers, M. (2004a). 'Networks, Firm Size and Innovation', *Small Business Economics* **22**(2):141-53.
- Rogers, M. (2004b). 'Competition, Agency and Productivity', *International Journal of the Economics of Business* **11**(3):349-67.

- Rogers, M. and Tseng, Y.-P. (2000). *Analysing Firm-Level Labour Productivity Using Survey Data*, Melbourne Institute Working Paper 10/00, University of Melbourne.
- Sandrey, R. and van Severter, D. (2004). *Has the New Zealand /Australian Closer Economic Relationship (CER) been Trade Widening or Deepening?*, Paper presented at TIPS/DPRU/Cornell University Forum 2004: African Development and Poverty Reduction: The Macro-Micro Linkage, South Africa.
- Siriwardana, M. (2006). 'Australia's Involvement in Free Trade Agreements: An Economic Evaluation', *Global Economic Review*, **35**(1):3-20.
- Siriwardana, M. and Yang, J. (2008). 'GTAP Model Analysis of the Economic Effects of an Australia-China FTA: Welfare and Sectoral Aspects', *Global Economic Review*, **37**(3):341-362.
- Wong, M-H., Page, D. Abello, R., and Pang, K. P. (2007). *Explorations of Innovation and Business Performance Using Linked Firm-Level Data*, Research Paper, Australian Bureau of Statistics cat. no. 1351.0.55.020, Canberra.