



29th Voorburg Group Meeting

**REVISED REVISITED SECTOR PAPER ON:
SOFTWARE PUBLISHING**

Terry Bradley

Producer Price Indexes, Australian Bureau of Statistics

James Luttrell, Producer Price Indexes

Australian Bureau of Statistics (ABS)

1. Introduction

This paper summarises the international progress and challenges in the measurement of turnover and price change for the Software Publishing industry, as well as any classification issues. The objective is to recommend best practices so that countries may have a point of reference for program developments in this area.

The information in this paper is sourced from the presentations, papers and summary notes from the 2013 Voorburg Group meetings in Tokyo, Japan. Papers were presented for Turnover statistics experience by Statistics Sweden and Statistics Canada, and papers were presented for Services Producer Price Index (SPPI) experience by the Federal Statistics Office (FSO) Germany, Statistics Sweden, and the US Bureau of Labor Statistics (BLS)

2. Standard classification structure

The countries' papers show that there is a strong similarity how this type of service is classified and measured between different statistical agencies. The challenge is in applying standards, as there is consistently a strong cross-over for companies between Software Publishing activities and Computer Programming activities (see point 2.1.1 "Challenges with Industry Classification"). As such, regular measurement of the balance of products and activities conducted by businesses is important to for classifying this industry correctly.

Interpretation of the service being measured

The countries have been in agreement on the main activities being measured: that Software Publishing refers to establishments engaged in publishing non-customised computer software for multiple clients. This is generally referred to as "packaged software" however delivery is increasingly mixed between packaged items and online delivery.

The establishments may design and publish, or publish only. The industry output includes services related to ensuring the successful use of the software, such as designing, providing documentation, assisting installation and technical support.

2.1 Industry Classification

ISIC

The *International Standard Industry Classification (ISIC Rev 4)* designates Software Publishing as Group 582, with a single Class 5820 for Software Publishing. This class is to include the publishing of ready-made (non-customised) software, including operating systems, applications and computer games. The sector excludes retail-only activity, production of unpublished (or customised) software.

At the boundaries of the ISIC classification, ISIC rev 4 describes "production of software not associated with traditional publishing" as 6201, which suggests that production and development of software does belong in 5820 if the intention is public distribution of standard (non-customised) versions, whether through retail or contract. Also at the boundaries is the treatment of internet-only publishing: the ISIC correspondence with NAICS 2012 lists "Internet publishing without traditional publishing" as included in 5820 whilst it is excluded from the NAICS 511210 (see below). This suggests that the boundary for internet publishing is not that software is distributed online but

whether the turnover comes from an internet provisioning or software hosting service, such as an online software market.

Although the ISIC Rev4 has this class sitting in a new Section J: Information and Communication compared to Rev 3.1 Section K: Real Estate, Renting and Business Activity, the class new itself is consistent with the old class 7221 Software Publishing

NACE

The *Statistical Classification of Economic Activities in the European Community* (referred to as 'NACE') (rev 2) designates the industry as 58.2 *Software Publishing*, and is broken into 58.21 *Publishing of Computer Games* and 58.29 *Other Software Publishing Services*. For Statistics Sweden, only NACE 58.29 *Other Software Publishing Services* is the subject of measurement in their SPPI due to the very small size of 58.21.

NAICS

The *North American Industry Classification System* (NAICS) designates the industry as 51121 *Software Publishers* and comprises establishments engaged in operations necessary for producing and distributing computer software and supporting its use. In the Canadian version of NAICS 2012 this is split further into NAICS 511211 *Software Publishers (excl. Video Games)* and 511212 *Video Game Publishing*; the US however does include video games in its NAICS 511210 *Software Publishers* class.

Unlike ISIC, Electronic Delivery Publishers, those that publish only online versions of software, are contained in a separate industry NAICS 519130 *Internet Publishing and Broadcasting and Web Searching*

2.2 Product Classification

NACPS

The *North American Product Classification System* (NACPS) 2012 has 15 low level product categories that are related to NAICS 51121 *Software Publishing* industry. Significantly it includes the types of software products along the division of *System Software* (operating system software, network software, database software) and *Applications Software* (business productivity applications, utilities, games) but it also separately designates the associated services (technical support, training services, licensing rights).

Statistics Canada currently uses NAPCS Canada (Provisional Version 0.1) which preceded NAPCS 2012. The Canada version also splits products along System and Applications Software, however it excludes Games software and also does not separately identify services such as technical support and training.

CPA

The CPA (2008) used by FSO Germany and Statistics Sweden classifies 10 low level products associated with NACE 58.29 *Other Software Publishing*. Similar to the NAPCS they are grouped around System Software and Applications Software, however unlike the NACPS they do not include

technical support services, with the only separated service product being Licensing Services. Also significant is that the CPA classifies online software and software downloads differently from packaged software.

2.3 Issues in Industry and Product Classification

Industry Classifications

A significant issue for classification and measurement is that the split between industries does not align well with current practices of businesses. There is significant cross-over between ISIC/NACE 58.2 *Software Publishing* and ISIC/NACE 62 *Computer Programming, Consultancy and Related Activities*. FSO Germany measured that in NACE 58.29 *Other Software Publishing* 39% of turnover came from activities related to NACE 62, and in NACE 62 businesses 16.8% of turnover was from non-customised software which is related to 58.29. Given in Germany NACE 62 records 10bn EUR turnover compared to 0.23bn EUR in NACE 58.29, it means the bulk of non-customised software activity related to NACE 58.29 may in some instances be actually incurred in NACE 62. The FSO paper suggested that much of software turnover is related to larger software projects, leading to businesses being classified in NACE 62, whereas NACE 58.2 is capturing only “pure” software publishers. Also tightly connected is NACE 63.1 *Data Processing, hosting and related activities, web portals*¹.

A comprehensive measurement of the Software Publishing industry will include a range of products & services that are produced in both ISIC 58.2 and ISIC 62. As such measurement of the balance of products and activities of businesses is important to for classifying their industry correctly.

For FSO Germany, this has led to combining together the 3 industries NACE 58.29, 62 and 63.1 for its published SPPI series, arguing that they all have the same products in common.

FSO Germany also argue it is difficult to explain to businesses the split between pre-packaged software and customising software. Businesses feel more aligned with Computer Programming than Publishing given software is continually updated and software depreciates much faster than other publishing activities.

There are also some inconsistencies in sub-industries between the industry classifications. Video Games are treated differently across countries: they are excluded from the class in Canada, and in Sweden are split out and not measured in their SPPI. Similarly, the exclusion of internet-only software publishing by NAICS is odd given the decline of “packaged” software, in that traditional software publishing whilst perhaps available on physical media will increasingly be available and updated via online download.

Product Classifications

FSO Germany comments that the “subdivision of CPA products according to their distribution channels (online, download, offline) seems odd”: even if distributed on CD an online version may often be available and updates may commonly delivered online². As such turnover cannot be

¹ Von Borstal, J - p3

² Von Borstal, J - p5

recorded accurately between the product classes, as turnover is only recorded with the license transaction but not the online updates.

Secondly, the levels of detail differ significantly between the CPA and NAICS, with NAICS having many more product types once the different distribution methods (online vs download) are eliminated. Significantly missing from CPA are Technical Support services, Training Services, and Computer Games.

3. Market Conditions and Constraints

The business models of the Software Publishing industry are changing, with new models for earning revenue and distribution method conflicting with the classification and measurement standards. Traditional “software publishing” (as packaged software) is on the decline, with business engaging in “full-service” offers to their clients which cross the classification industry lines³. For example: SAAS Software as a Service, Hosted Software. Open Source software models distribute the software for free but instead charge for providing support services.

Companies are also innovating with time-limited licensing and subscription models, and increasingly obtaining revenue from maintenance agreements with commercial and government accounts.

Frequent acquisitions of smaller companies by bigger companies also mean that predominant activity can change quickly between the industries.

Table 1: Summary of Turnover, Establishments, Employment and market concentration

	Turnover	Establishments and employment	Employment	Market concentration
Germany	0.7bn EUR (\$0.9bn USD)	400 establishments	4,800 employees	3% of establishments account for 58% of turnover
Sweden	17 bn SEK (\$3.5bn USD) 0.3% total turnover	2,363 establishments	10,129 employees	6% enterprises make 44% of turnover (and are foreign owned).
Canada	\$6.6bn (\$6bn USD)	-	30,000 employees	-
US	\$135,400bn USD	8,275 establishments	-	4 largest firms account for 40% of industry revenue

³ Garneau, M et al – p9

The profile of the software publishing industry differs significantly between countries. Across the various country papers, high market concentration was cited, with the majority of revenue produced from a small group of companies, often offshore. The US quite clearly dominates the world-wide market in this highly tradable service category, with turnover dwarfing other countries and presumably including a significant export market (Sweden and Canada themselves export at least 1/3 of turnover). Across the various country papers, high market concentration was cited, with the majority of revenue produced from a small group of companies, and Sweden cited that the most significant revenue-earners were foreign owned.

As such countries may differ in the extent to which they produce the software itself as the designers, or mainly license a foreign-owned product to consumers. This changes the focus of turnover and price measurement, as in ‘producing’ (designing) countries detailed product-based specifications are required where production occurs in several different strands, whereas if a country is predominantly ‘consuming’ the software a highly detailed specification may not be necessary, as the local production is restricted to licensing.

4. Turnover Statistics – Recommended Development Options

The main considerations from a turnover perspective are in effectively classifying businesses and activities to the Software Publishing industry. Much of the turnover related to ISIC 58.2 Software Publishing is undertaken in ISIC 62 Computer Programming.

Statistics Sweden and Statistics Canada detailed their approaches to turnover measurement, identifying some common issues. Statistics Canada measures turnover for the Software Publishing industry as part of an annual Survey of Software Development and Computer Services, including national and provincial estimates. Product data is also collected and is available on a national level. Statistics Sweden have an annual Structural Business Statistics collection that combines administrative data (from tax returns) with additional sample surveys to obtain more detailed information. The surveys request a specified income statement, from which turnover by product is obtained for each industry. Product data is used to ensure the Business Register is up to date and businesses are allocated to the correct industry.

Table 2: Options for developing Turnover Measures for Software Publishing

Category	Data Source	Level of Detail Collected	Frequency	Cost
Good / Best	Survey/ Census (admin components)	Industry turnover & product turnover Specific Software Publishing industry (ISIC 58.2 equivalent) and identify relevant activities produced in other industries.	Annual or Cyclical	- Most expensive - Largest response burden - Effort in classifying activities to correct industry
Minimum	Administrative Data (tax data, industry association)	Broad “software” industry amalgamation	Cyclical	- Least expensive - Little or no response burden

In terms of options for developing turnover estimates for the Software Publishing industry, the key challenge is in accounting for the cross-over in activities between the Software Publishing industry and related industries. The most informative approach would be to obtain product-based turnover information across the relevant industries. This would measure the non-customised software activity within related industry ISIC 62 or equivalent. In Germany's case, the related turnover in NACE 62 was found to be greater than in NACE 58.2.

To achieve this, a survey or census should be used as the product turnover information goes beyond the usual scope of administrative data holdings. Without this detail, data may only be able to be reliably collected as an amalgamation of software publishing and computer programming / consultancy activities; however this would have consequences to National Accounts use of the data. Of secondary importance is the frequency of collection: a cyclical collection every few years may be sufficient, however an annual survey is the ideal for National Accounts purposes. Quarterly turnover collections are sufficient at broader industry groupings and with low levels of detail if complemented by a more detailed annual or cyclical survey.

5.0 SPPI Recommended Development Options

Countries producing an SPPI for software publishing use a variety of pricing methods, given the complexity of products and services revenue models. It is recommended that countries developing an SPPI for Software publishing take account of the range of transaction types and services that companies charge and the destination of sales, being consumers, business and government sectors.

5.1 Price measurement

Typically software publishing involves a mixture of product licenses and maintenance services, with the latter a particular expense for larger commercial and government contracts. Licenses may be retailed to the consumer sector, but sales to business and government are significant and often have completely different products and price models being transacted through enterprise-specific contracts.

Licensing can be term limited or subscription based, and maintenance will usually be a percentage cost of the original license fee each year. Maintenance fees represent additional support and service on the software, often including regular updates. In some cases, maintenance fees explicitly give buyers the right to upgrade to subsequent versions at no cost, and hence the expense may be considered in part pre-payment for future upgrades⁴. Pricing should have correspondence with the relevant Product Classification to ensure the multiple types of product (licenses, tech support service etc.) are picked up.

Discounting is prevalent in the industry, and is commonly recorded internally as an average discount rate for sales performance reporting. As Germany notes, to prevent volatile price indices, discounting criteria or prevalence should be incorporated into the pricing method⁵. An example of discounting measurement is provided from the US BLS paper in Table 3 below.

⁴ Holdway, M et al – p5-6, cited in Von Borstal, J - p5

⁵ Von Borstal, J – p6

Table 3: Pricing methods described by US Bureau of Labour Statistics

Pricing method	When	How	Issues
Direct Pricing	Products are regularly transacted each reporting period to the same specification Typically mass-market software of same license type	Transaction price	Not suitable for variable license configuration contracts.
Unit pricing (including discounting)	Where license configuration varies by client e.g. 1 client buys 2 service licenses + 50 user licenses, next client buys 4 server + 20 users.	Provider reports average discount % given on all sales of particular license types to a particular type of buyer. Match against up to date list prices ➔ Derive discounted unit price	Requires consistency in the configuration of license types in typical sales
Component pricing	For variable license configurations where no unit price is observable	A recent transaction is chosen and its configuration of licenses is specified. Provider estimates the cost for selling that same configuration to a similar buyer in each reporting period.	Relies on estimated pricing, may not account for negotiating power.
Model pricing	Products transacted infrequently and where prices relate to the buyer and timing of the original sale - Particularly maintenance renewal price	Providers are asked for: - an estimated price for the original software if it were purchased 1 year prior to current period - Current maintenance renewal price based on that modelled software transaction	Providers have difficulty estimating an original license price in a period other than where a transaction was made. Significant complexity and judgement for provider.

Some innovative pricing strategies have been detailed by the US Bureau of Labour Statistics in Table 3. The approaches attempt to cater for the circumstances of corporate and government accounts where products may be sold infrequently (specialised products), where prices are negotiated based on the specific buyer type, market power and array of services and the time at which the purchase was made. In these circumstances, the prices arrived at are entirely contextual and hence the pricing strategy must retain the same context of a specific purchase and hypothesise this purchase and ongoing renewals forward in time using estimates from the provider. This has had some difficulties in the case of model pricing in the BLS, as estimating monthly price changes for infrequently

transacted software has required the BLS creating their own index-based estimate and sending it to the provider to confirm or correct.

Another method which can be used for measuring support services is a charge-out rate if it is available. FSO Germany uses hourly rates as one of the items businesses nominate for pricing their services⁶. This hourly rate may be appropriate for many activities that involve technical or onsite support, but it may not capture changes in enterprise contract prices.

5.2 SPPI development options

A summary of development options for countries investigating measurement are provided below. Key factors for index quality are that the index covers the range of products and services that are related to this industry, including maintenance services, technical support and renewals, and this is managed for some countries by having a product-classification as the basis for price measurement. Secondly the application of pricing techniques must be specific to the kind of transaction, picking up on different prices for different sectors: consumers, business, government.

Table 4: Options for developing SPPI measures for Software Publishing

Category	Pricing Method	Data type in the survey	Quality and Accuracy	Cost
Best	Multiple – unit price, avg discounting, model pricing, charge-out rates, license prices	Price for licenses and support. Product-based indexes. Distinguish between consumer prices, commercial and govt contracts.	Detailed specification accounting for license and maintenance array scenarios and discounting. Provider estimates for updated prices of infrequent transactions from another period Quality adjust for version changes and evolutionary feature upgrades	- Most expensive - Largest response burden - Requires additional judgement from providers
Good	License prices, charge-out rates	Price for licenses and support. Product-based indexes.	Detailed specifications of license products, support services and renewals.	- Expensive - Response burden
Minimum	Retail transaction price	Packaged license price only – retail CPI substitution	Limited quality as does not account for support services, renewals Does not account for sales to business and government	- Least expensive - Little or no response burden

⁶ Von Borstal, J – p2

5.3 Quality Adjustment

Software products need specific quality adjustment techniques that account for the continual updating and superseding of versions. Software packages typically are supported with minor upgrades and major version changes. FSO Germany has analysed that generally, minor software updates are not associated with price change⁷.

Table 4 below demonstrates the quality adjustment options that countries have implemented. FSO Germany has implemented the first 2 strategies, distinguishing that major version changes are adjusted differently to minor updates, with major updates implicitly adjusted to show no price change. However FSO's paper also identifies that there is potential for underlying price change during major version changes, and that a further explicit adjustment may be necessary to mitigate bias.

The US BLS has implemented a further explicit quality adjustment strategy with Production Cost adjustment. New versions of software have the new features costed via the Research and Development (R&D) input expenses, which is then turned into a unit price through factoring in the size of the customer base. This approach is not always possible however as it requires the R&D information to be collected based on the specific development project.

Table 4: Options for quality adjustment

	When	How	Issues
Direct comparison with old version	Minor updates (patches) to software	No quality adjustment	Not appropriate for major version changes.
Implicit adjustment: link to show no price change	New versions of software, where individual new features cannot be priced individually.	Price difference between versions is treated as only due to quality change	Rules out price changes during version change period. May result in some bias
Explicit adjustment: production cost	New versions of software, where new features can be priced through production inputs	Research and Development (R&D) costs associated with developments of new features or new versions are collected. R&D is then divided by size of customer base	Requires R&D costs to be available for the specific product development.

5.4 Other development options – product substitution

The US BLS has developed a substitution strategy for computer games, where prices typically depreciate over a long time period. Where there is a predictable continuing series of releases of

⁷ Von Borstal, J – p6

versions from the same game franchise, the price peaks at release but then depreciates rapidly over the cycle. To prevent continuous long-term depreciation the old version is substituted for the new version at release. Although this creates a jump in prices, this is considered an accurate representation of cyclical pricing in this industry.

6. National Accounts considerations

Sufficient detail on industry and product is required for correct allocation of activities within the framework.

The US BLS, which does identify Computer Games as part of its NAICS 51121 *Software Publishers* industry, considers sales of packaged systems and applications software as capital account, whereas sales of games software should be considered as personal consumption. As a result, the BLS makes available an SPPI that excludes Computer Games for use by National Accounts.

Distinguishing between pre-packaged software and custom software, or the industries more broadly, can be important. Statistics Canada states that “supply of pre-packaged software is an important control total used in determining software capitalisation across industries, since firms will often expense software, and these items are often not identifiable in input surveys”⁸.

7.0 Summary and Further Suggestions

The Software Publishing industry represents a challenge for statistical agencies to specifically measure it given the strong product correlation with computer programming, consulting and related activities in classification systems, as companies in reality operate with activities crossing over between both industries. Even so, an appropriate strategy for coverage of the industry will cover the range of relevant products and activities: the sales of license products as well as the services and development work that support these sales.

Countries developing turnover measurement of this industry can ensure high quality estimates through collections that, even if infrequently, measure the product and activity types of the industry alongside the products of the computer programming industry.

Countries developing SPPI measurement of this industry face significant challenges given the range of transaction types to different sectors. Whilst it is not clear that there is a single superior approach, countries can aim for higher quality estimates by going beyond simple license pricing to more abstract methods as suited to the complexity of transactions, such as unit pricing or model pricing, and taking into account the different markets for different sectors.

The treatment of quality change also demonstrates some differences between the countries described. Valuing new features incorporated into new versions of products may require additional information to be collected about business production costs.

⁸ Garneau et al, p 14

References

Country experience papers - 2014

- Statistics Sweden
Färnstrand, Jonas 2014: "Turnover and Output for the Software Publishing Sector in Sweden"
Accessed at: <http://www.stat.go.jp/english/info/meetings/vg2013/pdf/paper23.pdf>
- Statistics Canada
Garneau, Mary Beth; Ross, Irene; Farnsworth, Joan; Zuger, Georgie 2014: "Mini Paper on Turnover / Output for Software Publishers in Canada"
Accessed at <http://www.stat.go.jp/english/info/meetings/vg2013/pdf/paper22.pdf>
- FSO Germany:
Von Borstal, Johanna 2014: "SPPI for Other Software Publishing in Germany"
Accessed at <http://www.stat.go.jp/english/info/meetings/vg2013/pdf/paper24.pdf>
- Statistics Sweden
Friden, Marcus 2014: "Mini presentation for SPPI on NACE 58.2 Software Publishing in Sweden"
Accessed at: <http://www.stat.go.jp/english/info/meetings/vg2013/pdf/paper25.pdf>
- United States Bureau of Labour Statistics
Murphy, Bonnie 2014: "United States Producer Price Indexes for Software Publishing NAICS 511210 ISIC 5820 Software Publishing"
Accessed at <http://www.stat.go.jp/english/info/meetings/vg2013/pdf/paper26.pdf>

Other cited papers

Holdway, Michael; Swick, Roslyn B.; 2003: "Measuring Constant Quality Industry Output – Software Services"