

# **Service Products and Pricing Bundles – Discussion Paper on Treatment in Classification, Output Statistics and SPPIs**

30<sup>th</sup> Meeting of the Voorburg Group  
Sydney, New South Wales, Australia  
September 21-25, 2015

John B. Murphy  
Methodology Director for Classifications  
U.S. Census Bureau

This report is released to inform interested parties and to encourage discussion. Any views expressed on statistical, methodological, technological, or operational issues are those of the author and not necessarily those of the U.S. Census Bureau.

## **Introduction**

The use of bundling in markets is extensive and has existed for centuries. Economic and marketing literature includes extensive theory on approaches to building and pricing bundles. The focus of literature is almost exclusively on maximizing surplus capture and maximizing revenue. There are econometric models, normative models, probabilistic approaches, and numerous other forms of analysis for optimal design and pricing strategies in monopolies, duopolies, and competitive market settings.<sup>i</sup> One thing missing from the theory is how are products defined and what are the impacts of product definition decisions on classification systems, output programs, and price programs.

In 1997, at the 12<sup>th</sup> Voorburg Group meeting in Denmark, Ann Chadeau addressed several questions to the group regarding bundles of services. Specifically, the Voorburg Group was asked if there was a consensus on the following:

“Is there agreement on the three types of services-simple, composite or bundle?”<sup>ii</sup>

While this question was asked in the context of pricing services to enterprises, a deeper discussion of the question is warranted. Chadeau posited three types of services. The first was a simple service defined as a standard service that is measured by quantities such as hours, miles, etc. The second was a composite service, defined as a number of simple services that are produced together because of practice, regulation, or other reasons. The third was a service bundle that we defined as a set of services negotiated between the provider and the consumer. These three categories were also referenced by the United States Economic Classification Policy Committee when announcing the North American Product Classification System initiative in 1999.<sup>iii</sup>

This approach focuses on the composition of particular transactions but does not get to the elemental question of what is a product and what is a bundle. This question creates a number of problems for classifications, output programs and pricing programs because a focus on transactions is almost infinitely variable and subject to rapid change. This paper takes a fresh look at bundling of both goods and services and suggests some possible courses of action for classifications, output programs and price programs.

## **What is a product?**

There are a number of different definitions of products that are available. The CPC defines a product as a good or service that is the result of production in any economy.<sup>iv</sup> The North American Product Classification System (NAPCS) initiative provided a similar definition, “[products] are created and transacted (sold or transferred) by the reporting units to economic entities outside the individual reporting units.”<sup>v</sup>

These definitions leave much room for interpretation. While the requirement for output that is the result of production is relatively clear, adding in the requirement that a product must also be transacted creates some ambiguity. The transaction requirement was intended to eliminate from scope

intermediate outputs, those that are produced and consumed in the production process but also opens the door to including bundles of individual products in a classification because they are transacted in that way.

Products must be produced. This is a straight forward concept for the collection of final outputs. This excludes a number of things, which while important to businesses and markets, are out of scope for output product classifications. Used capital equipment, an important asset, is not produced as used. It is initially produced and any subsequent transactions are not new production (unless there is a margin activity or commission service produced to facilitate the transaction of the used asset). Most output product classifications would not identify manufacture of used machinery but should include wholesale or retail trade services in used capital equipment transactions.

Is production alone sufficient to define an output product? No because there is production for work in progress that will never be transacted as such.

Is transaction alone sufficient to define a product? Using the case above, a transaction for used equipment is not sufficient to define a product because there was no production.

In simple terms, to be identified in an output product classification, production and transaction are both necessary conditions. If there is production and eventual transaction, the resulting product (i.e., good or service) is within scope of an output product classification.

### **How to characterize service offerings?**

One approach is to look at terminology that is common in literature. Many studies focus on pure components (single products), mixed bundles (offerings of components and bundles of those components), and pure bundles (components are not available individually). Voorburg has reviewed simple, bundled, and composite services.

To review this topic in greater depth, some terminology should be applied to identify products from pricing bundles. A product is defined as a good or service produced and transacted. For services, this would broadly cover what has been called simple and composite services. The key is that regardless of the characterization as simple or composite, the product is the smallest level of service that is available separately and not dependent on the core service in the case of a composite service.

To illustrate, the rental of a hotel room is often identified as a composite service because it includes lodging but also maid service. The maid service is not available separately so it should be treated as a characteristic of the lodging rather than as a separate service when viewed from the transaction perspective. Another example is caller ID or call forwarding associated with landline telephony. Without the telephony, caller ID or call forwarding cannot be purchased. Although it is often billed for separately, it is not available unless tied to a core service. Thus, caller ID is a characteristic or optional inclusion for the core service of landline telephony.

A price bundle is a bundle of services or goods that are available separately but are grouped together and sold as a group. This sale often includes some level of discount for purchasing multiple goods, services, or combinations.

Price bundles are very common. In the United States, many wired telecommunication service providers offer bundles of land line service, Internet access, and television programming. Each of these services is available separately but are offered to the customer at a discount off the total price of each service separately. Wireless telecommunications providers often provide a bundle of goods and services such as a free or discounted smart phone with the purchase of a two year contract.

Price bundles can occur in many markets. If you buy four tires, you get a free alignment. If you buy four tires, mounting and balancing are free. If you buy our printer, you get free ink for life (I wish that really happened!). Probably one of the most commonly understood examples is a la cart menus and meals at restaurants. In each of these cases, multiple services are discounted when sold together but the individual services are also offered separately. These price bundles involve production and transaction but the most appropriate treatment in classifications, output measurement programs, and price programs is often not clear.

### **What does this mean for output product classifications?**

When looking at products in general, it is critical to identify the common or core good or service at the elemental transaction level. Output product classifications are intended to identify the object of measurement.

Output product classifications generally do not address quantity ranges in individual products. For example, product classifications include individual goods, for example a ream of copy paper. A ream of paper is one price, a case has ten reams at a discounted price per ream and a purchase of 10 cases has 100 individual reams at a discounted price based on the quantity. The product classification does not identify reams, cases, and 10 case lots, it identifies copy paper. Output product classifications also do not generally identify individual options for the core products. Classifications include core products like automobiles and light trucks but not automobiles with air conditioning or automobiles with optional sport interior packages. Those are characteristics of the products.

Because of the wide variation in services offered in the economy, the proper identification of the core service is of even greater importance. To use the lodging example again, the core service is lodging. Characteristics of the service can vary to include maid service, breakfast, internet access, etc. If those services are not available separately, the core product is lodging and the maid service, breakfast, internet access, etc. are characteristics of the product. This applies even if the output product classification identifies maid service as a stand alone product, meals as a stand alone product, and internet access as a stand alone product. There are cases where those services are offered separately by other producers and are themselves the core service produced and consumed.

If the core service is not properly identified in the classification, substantial problems can arise with measurement.

*Example: Wired telecommunications services*

*There are two concepts that could be used to define the core service provided by wired telecommunications carriers. The core service could be defined as access to the wired telecommunication network. No additional services or characteristics are available without access to the network. Under this definition of the product, individual options such as telephony, video services, or Internet access are characteristics of the core service. There is no bundle problem because the core service is uniquely identified and the additional features or characteristics can be collected. This conceptually aligns with how wired telecom firms report their revenue, market share, profitability etc. They focus on subscribers and revenue per subscriber.*

*If on the other hand, the core services are defined as telephony, video services and Internet access services, the ability to group these into bundles arises. These services are sold individually with distinct separate prices. However, they are also offered with quantity discounts for purchasing multiple services. Telephone and cable bundled together are one price, telephone and internet bundled together are offered at a different price, and all three are bundled together at yet a different price. A provider could arrange for multiple discounts for different packages but is still providing three services – telephone, cable, and Internet.*

When there are different ways to define the core service, subject matter knowledge, recordkeeping practices, and data user needs can help choose the most appropriate concept to apply when identifying products. A focus on practical considerations is important but the decision also has to make sense. In the example above, is access to the telecom network really the core product? How is the condition of the consumer changed through access to a telecommunications network unless other services are provided?

So, using this approach, the products would be the telephony, video services, and internet access services that are provided. Those are the core services.

The identified core services are available separately and prices for those services are available. Providers often bundle these together at discounted rates in order to maximize revenue per subscriber or reduce the surplus available for other providers. Should there be a separate product in the output classification for the bundle?

Going back to the definition of the product, there is production and there is transaction so they would be eligible but is the bundle really a different product or is it a pricing mechanism?

### **What are the impacts for Output Collection?**

There is very little impact on output collection if there are bundles identified as separate products in a product classification as long as they are defined in terms that are captured by producers in their records. In practice, the provider should be able to provide revenue for the individual services as well as the bundles. Generally, output is collected at nominal values and there is no attempt to ensure constant

quality – outputs are outputs. There is not a problem with mutual exclusivity because the bundle has been defined as a different product for the individual services.

### **What are the implications for SPPIs?**

The core definition of the products will have a significant impact on SPPIs in terms of quality adjustment. If the core products are chosen (e.g., voice, data, video) and there is no bundled product, normal quality adjustment for changes would apply. If a bundle is present, two separate quality adjustments would potentially be required when a service changes – one for the stand alone service and a second quality adjustment for a bundle that includes the stand alone service.

There are some other implications for bundles of products that are also offered as stand alone offerings. Going back the to wired telecom example, data users will face the following:

1. There will be no price index for *all* telephone service, all cable service, and all internet access.
2. There will be price indexes for each only when sold separately and excluding all discounted provision of the services as part of bundles.
3. There will be a price index for bundles that will include all of the discounts but also a mixture of services that can be fairly heterogeneous. The index will include telephone and cable bundles, telephone and internet bundles and cable and internet bundles. The separate product for bundles might make collection easier but result in data that could be hard to interpret or present misleading prices for the various services.

From a pricing perspective, it is relatively easy to collect prices for individual services alone and bundles of services. However, this approach does not allow for the commodity pricing of individual services sold individually and discounted as part of a quantity deal.

The presence of pricing bundles in transactions for SPPIs would require that the individual services be unbundled and the prices for each service reflected at their discounted levels. This is fine in theory but could create substantial burden for respondents if they do not readily make distinctions. If the respondent cannot provide unbundled prices for the individual services, a price statistician might need to develop an alternate method of estimating the individual service prices. An example comparing a quantity discount for goods compared to a quantity discount for services is included in Attachment 1.

### **What do the National Accounts Have to Say About Bundles?**

SNA 2008 provides some general guidance with the discussion of partitioning transactions in paragraphs 3.66 through 3.68.<sup>vi</sup> While the discussion is clear that certain transactions should be partitioned in finance, trade, etc., it is not clear that the same treatment should apply to bundles of goods and/or services that do not have different conceptual bases. The IMF's Balance of Payments Manual, Sixth Edition (BPM6) does include some guidance on recording international transactions and suggests that bundled transactions should be unbundled. BPM6 refers to this as partitioning in paragraph 3.17.<sup>vii</sup> The Manual on Statistics of International Trade in Services 2010 (MSITS2010) also notes that transactions

can bundle together payments but provides no guidance on the proper treatment of these bundled payments in the footnote to paragraph 4.42.<sup>viii</sup>

### **Proposal for treatment of products**

Although the reselling of services is a separate topic of the meeting this year, the international guidance on the treatment of reselling services ties in very nicely with the topic of bundling of services. The draft of Chapter 5, *Merchandising of Services*<sup>ix</sup>, in the guide to globalization that is being developed addresses when the transactions should be measured as gross and when reselling services should be treated as a net or margin activity. In essence, the guidance is that when outsourcing services, if there is a simple pass through, the measurement should be net. If the combination of services actually is of greater value or transforms the condition of the consumer, a gross measurement approach is more appropriate.

For example, if a producer outsources architectural work and then passes that architectural work on to a customer, there has been no additional transformation. If the same unit outsources the engineering work required to convert the architectural work into a detailed set of construction plans, and then passes on the plans, the total (buildable plans) is greater than the individual architectural work or engineering work. Reselling services would most likely want to measure the output of buildable plans at gross values rather than attempting to develop a margin for each “resale” of the services.

A similar approach can be taken when evaluating whether a transaction is a price bundle or is a unique simple or composite service product. In the case of the buildable plans, a unique product should be identified rather than treating the services provided as a bundle because buildable plans have been developed from the architectural services and engineering services. The final service output is greater than the individual services provided.

This would not necessarily be the case for wired telecom services. If a pricing bundle is offered that includes three services (voice, data, video), the sum of the condition change for the consumer is the simple sum of the individual services. Placing all three together in a single transaction produces a discounted price but does not change the condition of the consumer over three individual transactions.

## **Summary of Points for Discussion**

Definitions for Consideration:

Service Product – a simple or composite service that is the result of production and is transacted to a consumer of the product.

Price Bundle – a single transaction that includes more than one service product when the total change to the consumer of the price bundle is no greater than the sum of the individual service products.

1. A service product should be identified in a classification if it results in a unique change in condition for the consumer of the service.
2. A price bundle of services that meet the above criterion should not be identified in product classifications.
3. Price bundles are in effect volume discounts rather than separate products. As such, price bundles should be unbundled or partitioned into the separate products in measurement.



## Attachment 1. Comparison example of quantity discounts for goods and services

Is a pricing bundle any different than a quantity discount? If you buy 1 the price is \$10. Under a quantity discount of buy one/get one free, the practical price of one is \$5 each even though you have to buy 2. In an aggregate index for the item you need to include both the single and discounted prices in order to properly reflect the range of prices present in the market.

### Pure Quantity Discount Example - Copy Paper

Individual price = \$5.00/ream

Case price = \$4.50/ream

10 cases = \$4.00/ream

In order to have a price index for reams of paper, a program will collect across the possibilities and using probability proportionate sampling (or other methods of sampling) to choose a representative sample of transactions that reflect the universe of transactions. The aggregate price index for copy paper includes a mix of transactions accounting for various discounts that are available based on their relative importance. If the discount levels change for various quantities, those pure price changes would be reflected in the selected transactions in the price index. So if the case price drops to \$4.35 a ream and the 10 case price drops to \$3.95 a ream, the aggregate price index will reflect those changes based on their relative importance to the aggregate.

How does this example of quantity discounts apply to pricing bundles of services? One way of viewing bundles is as quantity discounts – buy one service at a price or buy three services at a discount off the total of the individual service prices.

One Service (wireline telephony) = \$30/month

Once Service (wireline Internet access) = \$30/month

One service (wireline video service) = \$30/month

Two Services = \$55/month

Three Services = \$82.50/month

If the price bundles of two or three services are treated as separate products, they would have separate price indices and any shifting of quantity discounts would not be reflected for the single service indices. If the services were unbundled, the price indices for each service could include the service alone or as part of a quantity discount with appropriate changes reflected in the aggregate index.

The example here implies that there is a \$2.50 per month discount per service for each product but that may not be the case. In fact, one or more services could subsidize the others. For example, the entire \$7.50 discount could be applied to the telephony and the Internet and Video services would remain at \$30/month when unbundled.

In theory, each of the component services in the pricing bundle would be separated and priced accordingly at the discounted rate. A commodity price index would then include a mix of transactions and discounts – transactions for a single service, transactions for the service when discounted for purchasing two and transactions for the service including a discount for buying three services.

## End Notes and Bibliography

---

<sup>i</sup> Venkatesh, R. and Vijay Mahajan (2009), “Design and Pricing of Product Bundles: A review of Normative Guidelines and Practical Approached,” pp. 232-257, *Handbook of Pricing Research in Marketing*, Vithala R. Rao (editor). Northampton, MA: Edward Elgar Publishing Company.

<sup>ii</sup> Chadeau A. [1997], APrices of Services to Enterprises,@ paper presented in Twelfth Meeting of Voorburg Group on Service Statistics, Copenhagen: Denmark, September 15-19, 1997.

<sup>iii</sup> 64 FR 18984-18989, accessed at [http://www.census.gov/eos/www/napcs/papers/Federal\\_Register.pdf](http://www.census.gov/eos/www/napcs/papers/Federal_Register.pdf)

<sup>iv</sup> Central Product Classification, Version 1.1, Statistical Papers, Series M, No. 77, Ver. 1.1. United Nations, New York (2004) – preface page iii.

<sup>v</sup> 64 FR 18984-18989, accessed at [http://www.census.gov/eos/www/napcs/papers/Federal\\_Register.pdf](http://www.census.gov/eos/www/napcs/papers/Federal_Register.pdf)

<sup>vi</sup> SNA 2008, UNSD, ST/EAS/STAT/SER.F/2/Rev.5.

<sup>vii</sup> Balance of payments and international position manual, International Monetary Fund, Washington DC, 2009. ISBN 978-1-58906-812-4

<sup>viii</sup> Manual on Statistics of International Trade in Services 2010. UNSD, Document ST/EAS/M.86/Rev.1, 2011. ISBN 978-92-1-161542-5

<sup>ix</sup> UNECE, Working Document No. 5, Meeting of Group of Experts on National Accounts, Interim meeting on Global Production, 12<sup>th</sup> session. Geneva Switzerland, April 3-4, 2013.