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# Measuring Payments for the Supply and Use of Intellectual Property

Carol A. Robbins

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## 4.1 Introduction

A clear set of metrics is critical for economists and policymakers interested in understanding the role of intangibles, intellectual property, and innovation in international trade and the domestic economy. In an influential paper, Corrado, Hulten, and Sichel (2005) estimate that business investment in intangible capital is as large as business investment in tangible capital—approximately \$1 trillion dollars per year, or about 10 percent of gross domestic product (GDP). Despite this substantial magnitude, comprehensive data about these investments and the incomes they generate are scarce.

Renewed interest in economic measurement of intangibles and intellectual property (IP) comes from multiple directions. Knowledge-intensive businesses are increasingly interested in developing external markets for their intellectual property, and these markets will depend on consistent valuation measures.<sup>1</sup> Policymakers are interested in metrics to evaluate the impact of intangibles, intellectual property, and innovation on economic

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1. See, for example, the *Global Innovation Outlook 2.0 Report, Building a New IP Marketplace* ([http://domino.research.ibm.com/comm/www\\_innovate.nsf/images/gio-ip/\\$FILE/building\\_a\\_new\\_ip\\_marketplace-report.pdf](http://domino.research.ibm.com/comm/www_innovate.nsf/images/gio-ip/$FILE/building_a_new_ip_marketplace-report.pdf)) and *The Intellectual Property Marketplace, Emerging Transactions and Investment Vehicles* (2007), by J. E. Malackowski, K. Cardoza, C. Gray, and R. Conroy, in *The Licensing Journal*, 27 (2): 1–11.

growth and competitiveness.<sup>2</sup> The upcoming revision of the System of National Accounts, which provides guidelines for internationally comparable measures of national economic activity, will change the treatment R&D expenditures to recognize these expenditures as the acquisition of an intangible asset. In preparation for this change, the Bureau of Economic Analysis (BEA) and national accountants in other countries are developing methodologies to incorporate R&D activity as an intangible asset into their accounts. Thus market-based information on the value of intangible assets and the measurement of payments and receipts for their use becomes increasingly important. However, existing survey data are sparse, and these data limitations will have a greater impact on the accounts than in the past.

This chapter provides the first detailed estimation of U.S. corporate income from the use of intellectual property, commonly called royalties and licensing fees. The existing Federal data sources for this income are described and U.S. corporate receipts for the use of this intellectual property component of intangibles are organized into licensing commodities and decomposed by industrial sector. Data are presented for 2002, the most recent year that Economic Census industry receipts are available.

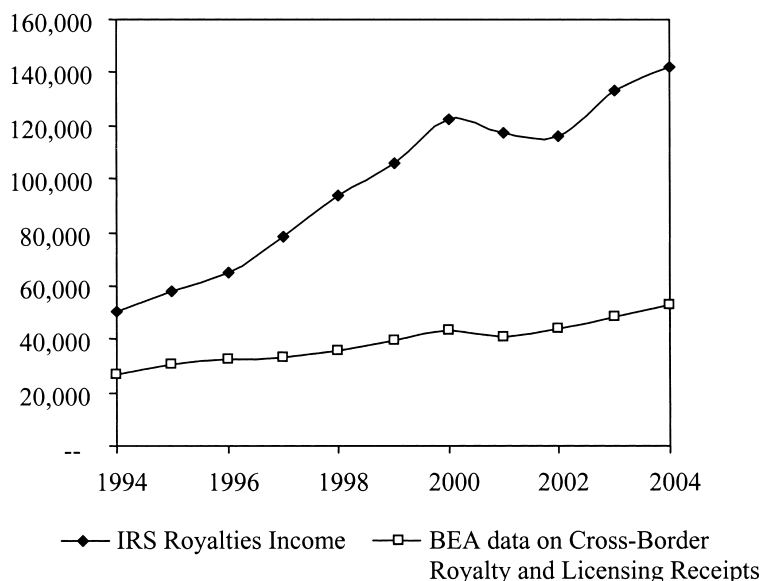
The income received by owners of intellectual property assets in these licensing or leasing-type transactions is on a par with the income received by owners of a large component of tangible assets in similar transactions. After adjusting U.S. corporate royalty income in 2002 for natural resource royalties and income earned by foreign sources, domestic income from licensing intellectual property is estimated to be approximately \$92 billion dollars; this compares with rental and leasing receipts for automobiles, machinery, computers, and other equipment of \$95.1 billion dollars in 2002.

Based on available evidence, payments and receipts for the use of IP through royalties and licensing fees are growing rapidly. Internal Revenue Service data from corporate income tax returns indicate that U.S. corporations received \$115.9 billion dollars in gross royalty receipts in 2002 (IRS 2005b). Figure 4.1 shows this royalty income for the years 1994 to 2004; the growth has been an average rate of 11 percent per year since 1994. This compares with an average growth rate of 6 percent per year for gross output of all private services producing industries over the same time period.<sup>3</sup>

The contribution to economic measurement that this chapter makes is a set of preliminary estimates for a series of IP-licensing transactions that are not separately reported in existing statistical data for large parts of the domestic economy. This income comes from four types of service commodi-

2. See, for example, the January 2008 *Report to the Secretary of Commerce's Advisory Committee on Measuring Innovation in the 21st Century*, available at <http://www.innovationmetrics.gov/Innovation%20Measurement%2001-08.pdf>.

3. Based on BEA GDP-by-industry data.



**Fig. 4.1 U.S. Corporate royalties income and cross-border royalty and licensing receipts (in millions of dollars)**

*Sources:* BEA: U.S. international services: Cross-border trade 1986–2005, royalties and license fees, Table 4. IRS: Statistics of income, “Returns of Active Corporations 1994–2004, Table 6—Balance sheet, income statement, tax, and selected other items, by major industry.”

ties—the use of IP protected as (a) industrial property by patents and trade secrets, (b) trademarks, (c) copyrights, and (d) business format franchises. Order-of-magnitude estimates of domestically earned corporate income for these commodities in 2002 are approximately \$50 billion dollars for licensing of industrial property, \$20 billion for licensing of trademarks, and \$10 billion each for the licensing of copyrights and franchises.

In the past, this lack of data had little impact on GDP because domestic business spending on intangibles as well as spending for its use or rental through royalties and licensing fees has been considered intermediate services. When the acquisition of intangibles is treated as investment instead of as intermediate services, these business expenditures become part of the investment component of GDP. The Bureau of Economic recognized computer software as investment in 1999 and currently plans to change the treatment of R&D activity to investment in the national accounts around 2012.

While some long-term data improvements are already underway, recognizing R&D as investment in the national accounts will require improved data sources. Because many intangibles are not sold in market transactions, there is limited opportunity to develop market-based price data to value these intangibles directly. With the exception of the comprehensive

expenditure data on R&D available from the National Science Foundation, information is also limited on expenditures for the creation of intangibles. In U.S. Census-reported data, most of these costs of creation and purchase are bundled together with other business expenses. However, royalties and licensing fees provide data on direct transactions for the use of technology, patents, trade secrets, trademarks, copyrights, and franchises. Because of the scarcity of information to consistently value intangibles, royalties and licensing transactions are important indicators. Expanded data collection of royalties and licensing fees for the domestic economy would provide quantitative measures of innovation and the value of intangibles, as well as improve the accuracy of the national economic accounts.

This chapter proceeds from here in the following way. Section 4.2 provides background information and defines the measurement concepts used in the paper. Section 4.3 outlines the kind of information about transactions for the use of IP that would be valuable for economic measurement and describes the issues that complicate this measurement. Section 4.4 describes the Federal statistical and administrative data that measure income from these transactions, and discusses the specific limitations of these data. The tables described in this section compare three Federal data sources on royalties income, BEA international services transaction data, Economic Census data, and IRS Statistics of Income data. This section also provides previously unreleased tables showing an industry sector distribution of royalties and licensing fees in unaffiliated transactions for 2002. Section 4.5 presents order-of-magnitude estimates that show corporate receipts by industrial sector for the use of IP by type—an area where current data are incomplete. Section 4.6 discusses the limitations of these estimates and the direction for future work in measurement. An appendix details the estimation methodology.

## 4.2 Background

### 4.2.1 Intangibles and Intangible Assets

For our purposes, *intangibles* are the useful result of productive activity that exists separately from any material object.<sup>4</sup> These products include literary, artistic, and entertainment creations, scientific and engineering innovations, as well as ideas for new products. Specific examples include a musical score, a collection of poetry, the plans for new machinery or structures, computer programs, and formulas for new chemical or pharmaceutical products.

4. This separate existence qualification is similar to the definition of intangibles in Hill (1999). Hill's paper also includes a thoughtful discussion of the economic distinctions between goods and services and their relationship to intangibles.

For other analytical purposes, intangibles are sometimes defined more broadly. For example, in the Brookings Task Force Report on Intangibles, *Unseen Wealth*, the scope of intangibles includes qualities that are inseparable from the people who work with them. For firms, intangibles can include human capital, core competencies, organizational capital, and relationship capital (Blair and Wallman 2001). Since these important qualities cannot be separately rented or licensed, they are outside the scope of this chapter.

#### 4.2.2 Intangible Assets, Intellectual Property, and Types of Protection

When intangibles meet the additional qualification that they produce *future* economic benefits, some economists identify these intangibles as assets (Corrado, Hulten, and Sichel 2005). However, both financial accounting standards and national economic accounting standards require a further qualification for assets: that the owner has the power to control the asset and obtain the economic benefits.<sup>5</sup> It is this more restrictive accounting concept of an asset that is used here.

The term *intellectual property* in this paper refers to intangible assets that are protected by a legal right to exclude others from their use. Types of intellectual property protection include copyrights, patents, trademarks, trade secrets, and sui generis rights. These protections are briefly described:

##### *Copyrights*

Copyrights are legal rights that protect original works of authorship. In the United States, these rights are granted by registering the original work with the Copyright Office of the Library of Congress. The types of works protected are (a) literary works; (b) performing art works, such as musical works, dramatic works, motion pictures, pantomimes, and choreographic works; (c) periodicals and magazines; (d) visual artworks; (e) sound recordings; (f) architectural works; and (g) computer programs (United States Copyright Office 2004).

##### *Patents*

Patents protect useful inventions and designs of three types: utility patents, design patents, and plant patents. Most U.S. patents are utility patents, which provide for a limited time the exclusive right to a nonobvious invention with a practical application. These inventions can be processes, machines, manufactures, and compositions of matter. In addition to utility patents, the United States grants patents on designs and on newly invented or developed species of living plants. In each case, the character-

5. System of National Accounts 1993, Paragraph 13.12. The International Accounting Standards paragraph 38.8 definition is cited in Lev 2001, 151.

istic quality of a patent is novelty. Patents are granted by the U.S. Patent and Trademark Office in the Department of Commerce (USPTO 2005).

#### *Trade Secrets*

A trade secret is any valuable and not generally known information that is kept secret by its owner and has economic value attached to its secrecy. The secret may be a formula, pattern, compilation, program, device, method, or technique. Protection is granted by the Uniform Trade Secrets Act, and is fundamentally different from that of a patent or copyright in that the secret information need never enter the domain of public knowledge (NCCUSL 1985).

#### *Trademarks*

Trademarks are brand names and the symbols associated with them. Like patents, trademarks are granted by the U.S. Patent and Trademark Office of the Department of Commerce. The characteristic quality of a trademarked good is distinctiveness; trademarked goods or services must be able to be distinguished from those of another producer. While the right to exclusive use of the symbol does not expire, trademarks that become a generic term lose their right to protection.

#### *Sui Generis Rights*

These are laws that provide legal protection to industrial designs. In the United States, protection for the layout of microelectronic circuitry on a semiconductor chip mask is established by the Semiconductor Chip Protection Act (SCPA) of 1984, which grants the owner exclusive use for ten years. Similarly, the Vessel Hull Design Protection Act (VHDPA) of 1998 provides legal protection for the design of ship hulls (United States Copyright Office 2004).

### 4.2.3 Service Commodities That Correspond to Types of IP Protection

When a firm receives royalty income for the use of intangibles protected as intellectual property, what economic activity has taken place? While the purchase of all the rights of ownership of intellectual property is the purchase of an intangible asset rather than a service transaction, the purchase of only the right to use these assets for a limited time is considered here to be the purchase of a service commodity. Because intangibles provide inputs to the production process in much the same way that labor, tangible capital assets, and computer software provide service flows, this service commodity is the rental of an intangible asset that is protected as intellectual property.

How can these service commodities be identified? The method described here is based on type of intellectual property protection and the way the IP

**Table 4.1** Examples of receipts for different types of IP-related commodities

Commodity type	Patent or trade secret protection of industrial property	Copyright protection for artistic or literary expression
IP-protected intangible assets	Trade secret or patented industrial process and all future rights	Copyrighted song, including all future rights
IP-derived products	Industrial products produced with protected technology—for example, chemicals	Purchase of a recording of the soundtrack
Licensing of IP assets	Licensing a patented or secret industrial process for use in production	Licensing the right to use a musical score in commercial advertising

is used in production. This framework is proposed by Mohr and Murphy (2002) for product classification. The following example for two types of IP, a patented industrial process innovation and a copyrighted musical composition, shows the relationship of these service commodities to other IP-related commodities. For each type, separate commodities can be produced: (a) the IP assets, (b) goods with IP embedded in them, and (c) leasing and subleasing of the assets for economic use.

In table 4.1, the first commodity, IP-protected intangible assets, is purchased in a transaction where the purchaser gains all future rights to the IP. In contrast, when IP-derived products are purchased, the right to reproduce the product for further sale is not part of the transaction. The third commodity, licensing or leasing of intellectual property, allows the IP to be used in production without conveying ownership.

Transactions for computer software can fall into any of these categories. When software is mass produced and shrink-wrapped, BEA considers it a good; otherwise, it is a service. Payment for the right to use software with a useful life of a year or more without the additional right to reproduce is considered the purchase of a fixed capital asset. However, end-user software licenses are not generally the same type of licensing transaction as the IP-licensing commodity described previously because these end-user licenses do not allow for the software to be reproduced.

This set of examples uses the type of intellectual property protection to distinguish different types of commodities. This approach works well to separate industrial processes and formulas from artistic and literary originals, and it corresponds to the way that existing data are collected. Additionally, although this commodity framework is consistent with the treatment of royalties in the System of National Accounts, it is not the only way royalty transactions could be treated. Other ways to classify these IP-licensing commodities are plausible, such as based on the technology involved.



### 4.3 Uses of Data on IP-Related Income and Some Measurement Issues

#### 4.3.1 What Would We Like to Know about Intellectual Property Income and IP-Licensing Commodities?

This section describes the questions we are interested in.

1. For international transactions, which countries are earning income from trade in intangibles and their use, and which countries are paying? Are these transactions predominantly within multinational corporations, or between unrelated companies?

2. What type of intellectual property do these transactions cover? Can transactions for the purchase of IP be separated from transactions for the use of IP and transactions for IP-embedded products?

3. What industries are most heavily engaged in these transactions?

4. Within the domestic economy, which industries produce intellectual property and intangible assets as part of their output, and how much do they produce? Which industries earn incomes from the licensing of these assets, and how much do they earn?

5. Which industries purchase or pay to use intellectual property and intangible assets produced by other industries, and how much do they pay?

6. In order to understand the impact of intangibles and their use on output and productivity, can we specify a unit of output and a price index for deflation?

Existing statistical data provide information about the first question, and a partial answer to the second and third questions. When the transactions are components of international trade, they are reported in BEA's international services trade data. For the domestic economy, data are available for royalty and licensing receipts for some industries, but no information is available about industry expenditures. The IRS statistics of income provide industry data on total royalty income, but these data include income from foreign sources and lack a breakdown by type of IP. The result is an incomplete picture of this activity for the domestic economy.

#### 4.3.2 What Is the Relevant Unit of Output for IP-Licensing Commodities?

One of the most basic questions for economic measurement is to specify a unit of output that can be priced over time in order to create measures of real output. The difficulties with pricing intangibles—for example, R&D output—are well known. Many intangibles are by their nature unique, and a patented innovation can represent a marginal improvement in the quality of an existing product, or can create an entirely different category of products.

The unit of output associated with the rental or licensing of intellectual

property is similarly difficult to specify. Licensing of industrial processes can range from precommercial designs to the right to duplicate a fully developed device, system, or service (Razgaitus 2003). Accordingly, the degree of risk will vary, as will the structure of the payments. These royalty payments often have two parts—a lump sum payment made up front, and a running royalty that is calculated as a percent of receipts. Further, technology licensing is often a bundled commodity, consisting of both the rights to use the intellectual property as well as proprietary technical information and access to technical support on how to use the licensed technology. Similarly, business format franchises often combine the right to use a trademark together with manuals and other forms of instruction on how to operate the business.

Royalty rates for musical performance vary based on whether the royalty is for performance or recording, and on the negotiating strength or market power of the artist. Royalty rates for trademarks vary by type of product and the market power of the brand; a range of 3 percent to 10 percent is reported in Razgaitus (2003).

What price index should be used, then, for these transactions? Neither the Bureau of Labor Statistics nor the BEA has yet developed price indexes for these commodities. Khatchadourian and Wiesner (2006) note that the heterogeneity of the transactions categorized as royalties and license fees complicate the development of a price index. The BEA currently deflates the output of the intangible assets rental industry (Lessors of Nonfinancial Intangible Assets [except Copyrighted Works]) with a much broader deflator, the implicit price deflator for personal consumption expenditures.

#### 4.3.3 Transfer Prices and Intra-Firm Transactions for Intellectual Property

Given the complexity of identifying and pricing intellectual property licensing transactions, it is not surprising that most intellectual property is used within a firm. Within a firm the benefits of integration, lower transactions costs, and the avoidance of monopoly rents in input markets can be realized. In most cases, these internal transactions are unobserved, and pricing information is closely held.

Transfer prices are used to allocate costs and profits within the firm. These estimated prices for intrafirm transactions are also needed for taxation and economic accounting purposes when commodities cross international borders. The general rule of transfer pricing is to estimate the price that would be observed if the transaction was an arms-length transaction between unrelated parties. Three different approaches are frequently used: estimating the cost of production or acquisition of the products, estimating the price that would obtain if the product were purchased in external market based on comparable products, and estimating the net present value of the income the product will earn.

Although the external market-based approach is preferred as the most objective, for intellectual property it is difficult and sometimes impossible to identify comparable products. The cost approach and the income approach may yield very different estimates from each other, depending on the time horizon applied to the benefits, the discounting for uncertainty, and the extent to which the benefits of intangibles can be separately estimated. For products that have been in development for a long time and are part of a family of related products, it may also be difficult to separately identify the costs of a particular intellectual property commodity. Finally, the historical cost of creating the commodity may be quite different from what it would cost to recreate the product in current dollars with current technology. For more discussion of these transfer pricing issues for intangibles, see Bos (2003).

When the transferred commodity is a private good (nonjoint in consumption and excludable), the optimal transfer price is found by setting the marginal benefit the affiliated firm receives from using the input to the parent firm's marginal cost in producing the transferred commodity. However, the public-goods characteristics of intangibles and intellectual property also make them more subject to ambiguity in the setting of transfer prices than would be the case for tangible goods, and thus more vulnerable to manipulation based on disparities in international tax regimes. In an example that is directly relevant to royalty payments for the use of intellectual property between multinational parents and their foreign affiliates, Bos (2003) shows that when the commodity being transferred has public-goods characteristics (joint in consumption and nonexcludable), multinationals can set the royalty payments independently of revenue, cost, technology, or market conditions. Since the transferred commodity is a public good that can be used in more than one location simultaneously, the marginal cost of the intangible is set equal to the sum of the marginal benefits for the entire firm, and the profit-maximizing royalty payment from the affiliate is indeterminate.

The implications of transfer pricing issues and differences in tax regimes for international trade data are further discussed in this volume by both Lipsey (2006) and by Mutti and Grubert (2006). Mutti and Grubert describe the use of hybrid entities by multinational corporations to move their intellectual property to other countries in order to lower their overall tax liabilities. A firm that anticipates future royalties from an R&D activity can set up a cost-sharing agreement with a foreign subsidiary, whereby the foreign subsidiary buys a stake in a patent before it generates income. The subsidiary earns profits from the use of intellectual property in a low-tax location, while royalties and licensing fees, which are deductible from the firm's tax liabilities, are paid in a high tax location. As Lipsey points out, the location of intangibles is particularly susceptible to the kinds of manipulation that lead to distortions in service trade data. Lipsey illustrates the very high ratio of capital income to labor for the low-tax location Bermuda (13.007), compared to an average for Europe of 0.439.

#### 4.3.4 Cross-Licensing and Measurement of Income from the Use of Intellectual Property

In order to understand the full magnitude of the flows of IP-licensing commodities in the economy, data on the gross values of licensing transactions would clearly be preferred. However, reported cash income from licensing and other royalties is an underestimate of the gross value of the transactions to each firm and an underestimate of the magnitude of the flows of IP between firms and industries because of the prevalence of cross-licensing agreements. In cross-licensing agreements, firms exchange access to other's patent portfolios. Where the estimated value of the patent portfolios differ, a net royalty is paid by the owner of the lesser-valued portfolio. If the value of each party's relevant intellectual property is considered to be equivalent, then the cross-licensing agreement involves no direct exchange of payment.

Although cross-licensing agreements reflect exchanges of economic value that should, in concept, be incorporated into BEA's measures of industry and commodity output, their full extent is unknown. Cross-licensing agreements are particularly important in industries like electronics, semiconductors, aircraft, and automobiles (Grindley and Teece 1997).

The general rule for income that is subject to taxation by the Internal Revenue Code is that gross income includes income from whatever source derived, and that barter income is subject to taxation. However, the practice of IRS has been to value as income only the net amount of cross-licensing transactions. After asking for comments on the treatment of cross-licensing arrangements, a 2007 revenue procedure rules that for unrelated parties, qualified patent cross-licensing arrangements are to be valued for income purposes as by a "net consideration method." That is to say, reported income from the agreement should be the cash received net of the license rights and intangible property from the other party. The revenue procedure goes on to say that this treatment is consistent with the way that generally accepted accounting principles treat income from cross licenses (IRS 2008).

With respect to BEA's international service transactions data, the two-way (gross) value of the transactions rather than the net value is what is both intended to be measured (Ascher and Whichard 1999) and what is specified in the survey instructions (BEA 2006). Although no specific instructions are provided to respondents on the treatment of cross-licensing agreements for patents, companies are instructed in the BEA's survey forms to value reciprocal exchanges at market rates and report them as a receipt and an offsetting payment. Since this treatment as a gross measure is different from the way that many firms report cross-licensing receipts on their income tax forms, it is possible that the values reported to BEA from cross-licensing agreements are net rather than gross measures and thus underestimate the value of the transaction. Economic Census data reflect ac-

tual cash receipts, and thus also reflect a net concept of licensing income. All of this suggests that the existing measures of income from IP-licensing underestimate the full extent of this activity.

#### 4.3.5 Industry Classification Based on Enterprise or Establishment

Although royalty and licensing income is received by many industries, for one industry the North American Industrial Classification system (NAICS) characterizes this activity as primary—Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)—NAICS 533. This industry rents intangibles and intellectual property such as patents, trademarks, brand names, and business formats used under franchise agreements.

One example of a firm in this intangible asset rental industry comes from a review of publicly available Securities and Exchange Commission filings. Competitive Technologies of Fairfield, Connecticut describes itself as a full service technology transfer and licensing provider, representing technologies invented by corporations, individuals, and universities. Although its income is mainly derived from license and royalty fees, the firm also gains some of its income as shares of royalty legal awards that result from litigation (Competitive Technologies SEC Filing, 2007). It is this latter activity that has earned some firms in this industry their characterization as “patent trolls.” Both IRS data from corporate income tax returns and BEA international services trade data are collected at the unit of the firm or enterprise (BEA, 1998).

Other data, for example Economic Census data on royalty receipts, are classified by industry based on the activity of individual establishments. These separate establishments are single-unit companies as well as separate workplaces that comprise a multi-unit company. When industry classification is assigned based on establishment activity, the establishments in the intangible asset rental industry may be attached to any industry but perform the economic activity of leasing the firm’s intangibles and managing its intellectual property portfolio. Economic Census data currently identifies a small number of establishment types as receiving IP-licensing income.

#### 4.4 Existing Statistical and Administrative Data

Existing data from BEA, Census, and the IRS Statistics of Income program can be used to estimate income from the use of intellectual property and IP-licensing commodities. These three data sources are compared in table 4.2. Reported receipts differ greatly. While BEA data report \$44.5 billion dollars in receipts by U.S. firms from foreigners, in both affiliated and unaffiliated transactions, Census data, which include both receipts for exports and for domestic transactions, report just \$24 billion dollars. A third source, administrative records data from the IRS based on corporate income tax returns, reports royalty income of \$115.9 billion dollars for U.S. firms.

While each source covers many of the same types of IP-licensing trans-

**Table 4.2 Summary of data sources for royalty-related receipts and income**

Data source	Receipts or income for 2002 (in billions of dollars)	Coverage	Scope of royalty and licensing rights
BEA international services transactions, receipts for royalties and licensing fees	44.5	U.S. receipts in international transactions from both affiliated and unaffiliated entities. Data are also available on payments	Industrial processes, including patents and trade secrets; books, records, tapes; broadcasting and recording of live events; franchises; trademarks; general use computer software; other intangibles; includes purchase as well as use of these intangibles
Economic Census royalty receipts	24.0	U.S. establishments with paid employees, Census data only available for selected industries	Content published on the Internet; musical compositions; master recordings; television program rights; oil and petroleum; patent leasing and licensing; franchise leasing and licensing; software, music, motion picture, and other intellectual property; literary works, musical recordings, filmed entertainment, and other cultural works
IRS royalty income	115.9	Gross royalty income for U.S. corporations, including income from foreign sources	Books, stories, and plays; copyrights; trademarks, formulas, and patents; exploitation of natural resources

*Sources:* BEA: U.S. International Services: Cross-Border Trade 1986–2005, Royalties and License Fees, Table. 4.

Census: 2002 Economic Census, "Subject Series," Table 1, Product Lines

IRS: Statistics of Income, "Returns of Active Corporations 1994–2004, Table 6-Balance Sheet, Income Statement, Tax, and Selected Other Items, by Major Industry."

actions, the IRS data covers royalty income from all enterprises with tax liability, while the BEA data covers only the portion of licensing income earned in transactions with foreign residents. In contrast, the Economic Census data separately reports income for the sale of licensing commodities for only a limited number of establishment types. Licensing income received by other establishments may be included in Census-reported total receipts for other industries, but is not separately identified.

#### 4.4.1 BEA International Royalties Data

For the United States, international transactions in royalties and license fees are an important part of technology trade in services. In 2002, royalties and licensing fees made up about 16 percent of the value of exports for total private services, and about 9 percent of the imports. However, for affiliated trade, these ratios are higher; 44 percent for exports and 33 percent for imports. In BEA data, these royalties and licensing fees are combined with payments and receipts for the purchase of intangible assets and thus present undifferentiated income for the IP-licensing commodities along with income from the sale of assets. For this combination of transactions, BEA collects data separately on affiliated transactions, those conducted between multinational parent firms and their subsidiaries in a different country, and on unaffiliated transactions, those conducted between unrelated parties in different countries.

The largest share of service trade reflected by royalties and license fees is between the U.S. and other developed countries; this is true for both affiliated and unaffiliated trade (table 4.3). Tax-related effects on the trade flows in affiliated trade data are suggested by the presence of low-tax locations Bermuda and the Netherlands as top-five recipients of large shares of royalties and licensing fees.

Table 4.4 shows the magnitudes of transactions in three broad categories: between unaffiliated parties, transactions between U.S. parents from their foreign affiliates, and transactions between U.S. affiliates and their foreign parents. The majority of royalty and licensing transactions by dollar value are between multinational corporations and their affiliates. These royalties and licensing fees are paid for the use of several types of intangibles, but only the smaller component of the transactions—trade between unaffiliated parties—is currently collected and can be analyzed by type.<sup>6</sup>

6. In 2008 BEA released data on royalties and licensing fees by type of IP for affiliated transactions covering the years 2006 and 2007. While the breakdown by type of IP is not available for affiliated transactions for years prior to 2006, BEA's 1989 Benchmark Survey of U.S. Direct Investment Abroad does provide a breakdown for receipts and payments between U.S. parents and their foreign affiliates (Table I.X.I). These measures are not directly comparable to current data because the large category of general use computer software was not part of the estimates in 1989. In 1989, 88.5 percent of the receipts from foreign affiliates to U.S. parents were for the use of industrial processes (patents, formulas, and trade secrets). In that same year the share for receipts for the same categories from unaffiliated transactions was substantially lower, 68.1 percent.

**Table 4.3** Royalties and license fees, between the U.S. and top five countries, 2002 (in millions of dollars)

	Receipts		Payments	
	Affiliated	Unaffiliated	Affiliated	Unaffiliated
Total	32,770	11,738	15,134	4,219
Top five				
United Kingdom	3,402	3,236	4,566	688
Japan	3,102	1,073	1,710	512
Canada	2,407	939	1,701	472
Singapore	2,337	906	1,443	440
Germany	2,052	707	1,357	409
			Total	Total
			Top five	Top five
			Japan	France
			Germany	United Kingdom
			Switzerland	Switzerland
			Netherlands	Japan
			Bermuda	Other European countries*

\*European countries other than Belgium-Luxembourg, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom.

Source: BEA: U.S. International Services: Cross-Border Trade 1986-2005, Royalties and License Fees, Table 4. <http://www.bea.gov/bea/di/1006serv/tab4.xls>.



**Table 4.4 Cross-border royalties and license fees, 2002 (in millions of dollars)**

	Total	Industrial processes <sup>a</sup>	Books, records, and tapes <sup>b</sup>	Broadcasting and recording of live events <sup>c</sup>	Business format franchise fees <sup>d</sup>	Trademarks <sup>e</sup>	General use computer software <sup>f</sup>	Other intangibles <sup>g</sup>
Receipts								
Between unaffiliated parties	11,738	4,039	516	296	542	1,284	4,408	651
By U.S. parents from their foreign affiliates	29,656							
By U.S. affiliates from their foreign parents	3,114							
Receipts total	44,508							
Payments								
Unaffiliated payments	4,219	2,049	301	906	3	283	487	190
By U.S. parents to their foreign affiliates	2,925							
By U.S. affiliates to their foreign parents	12,209							
Payments total	19,353							

*Source:* Data are from BEA's International Investment Division and are available on the BEA website as U.S. International Services: Cross-border Trade, 1986–2005; Table 4, Royalties and License Fees 1986–2005. These data are collected on BE-577 for transactions between U.S. parents and their foreign affiliates and the BE-605 for transactions between U.S. affiliates and their foreign parents.

*Note:* In 2002, royalties and licensing fees made up about 16 percent of the value of exports for total private services, and about 9 percent of the imports. <sup>a</sup>This includes the use, sale, or purchase of intangibles that are used in connection to the production of goods as well as technology licensing fees, royalties, and payments for the use of patents, trade secrets, and other proprietary rights used in the production of goods. The category includes payments to foreign governments for the maintenance of patent rights.

<sup>b</sup>This includes the rights to perform, broadcast, reproduce, and sell copyrighted material and other intellectual property in the form of books, compact discs, and audiotapes.

<sup>c</sup>This includes the rights to record and or broadcast live artistic performances, sports events, and other live events.

<sup>d</sup>Business-format franchising is an ongoing business relationship between a franchisor and franchisee that includes not only the product, service, or trademark, but also the business format.

<sup>e</sup>This includes rights to sell under a trademark, brand name, or signature, including Internet domain name registration.

<sup>f</sup>This includes rights to distribute general-use software and rights to reproduce or use general-use computer software electronically produced from a master copy. It includes licensing fees for reproducing copies of general-use software for local area network computer systems and excludes prepackaged software as well as custom software and programming services.

<sup>g</sup>Intangibles not elsewhere classified, including rights to secure capacity for communications carriers.

**Table 4.5** Receipts of royalties and license fees from unaffiliated foreigners, by industry sector and type of intangible, 2002 (in millions of dollars)

	Total	Industrial processes	Other <sup>a</sup>
All industries	11,738	4,039	7,699
Manufacturing	3,585	2,809	777
Distributive services <sup>b</sup>	271	29	242
Information <sup>c</sup>	(D)	(D)	4,368
Professional, scientific, and technical industries <sup>d</sup>	1,159	342	818
Other industries <sup>e</sup>	(D)	(D)	(D)

*Source:* Special tabulation by BEA's International Investment Division.

*Note:* (D) Suppressed to avoid disclosure of data of individual companies.

<sup>a</sup>Other consists of payments for rights related to books, records, and tapes; broadcasting and recording of live events; franchise fees; trademarks; general-use computer software; and other intangibles.

<sup>b</sup>Includes wholesale and retail trade and transportation.

<sup>c</sup>Includes publishing, software publishing, motion picture, and sound recording, broadcasting, telecommunications, and Internet services.

<sup>d</sup>Includes computer system design and related services, and scientific research and development services.

<sup>e</sup>Other industries include unallocated payments.

The BEA data on transactions between unaffiliated parties are collected by industry classification as well as by type of intangible. For these measures, the industry assignment is the industry of the consolidated enterprise, which may consist of more than one establishment. Tables 4.5 and 4.6 provide a previously unpublished summary of the industry distributions of unaffiliated payments and receipts prepared by BEA's International Investment Division for 2002, which shows the magnitude of receipts and payments for IP for industrial processes protected by patents and trades secrets in the manufacturing sector.

The underlying confidential data used for these tables were analyzed by the author under an agreement with BEA's International Investment Division not to disclose respondent-specific information. The following observations are based on analysis of this underlying data.<sup>7</sup> In 2002 the manufacturing sector received \$2.8 billion in unaffiliated international receipts for use of IP for industrial processes protected by patents and trades secrets; this accounted for about three quarters of the sector's \$3.6 billion receipts. Within professional, scientific, and technical industries, a little less than half of the \$1.2 billion dollars of receipts are for general-use software, and more than a quarter are for IP for industrial processes protected by

7. Annual Survey of Royalties, License Fees, and Other Receipts and Payments for Intangible Rights between U.S. and Unaffiliated Foreign Persons (BE-93).

**Table 4.6** Payments of royalties and license fees to unaffiliated foreigners, by industry sector and type of intangible, 2002 (in millions of dollars)

	Total	Industrial processes	Other <sup>a</sup>
All industries	4,219	2,049	2,170
Manufacturing	2,933	1,776	1,157
Distributive services <sup>b</sup>	66	(D)	(D)
Information <sup>c</sup>	596	2	594
Professional, scientific, and technical industries <sup>d</sup>	(D)	(D)	85
Other industries <sup>e</sup>	332	59	273

*Source:* Special tabulation by BEA's International Investment Division.

*Note:* (D) Suppressed to avoid disclosure of data of individual companies.

<sup>a</sup>Other consists of payments for rights related to books, records, and tapes; broadcasting and recording of live events; franchise fees; trademarks; general-use computer software; and other intangibles.

<sup>b</sup>Includes wholesale and retail trade and transportation.

<sup>c</sup>Includes publishing, software publishing, motion picture, and sound recording, broadcasting, telecommunications, and Internet services.

<sup>d</sup>Includes computer system design and related services, and scientific research and development services.

<sup>e</sup>Other industries include unallocated payments.

patents and trades secrets. The industry within the sector receiving the largest share of industrial process royalties is the Scientific Research and Development industry (NAICS 5417), followed by Architectural, Engineering, and Related Services (NAICS 5413).

Table 4.6 shows the corresponding data for industry payments of royalties and licensing fees by industry sector. This is the only information from the Federal statistical system about which industry sectors are *using* intellectual property through licensing and royalty transactions, and only international transactions are reported. In 2002, manufacturing industries paid out \$2.9 billion of the total of \$4.2 billion, with 61 percent of that going for IP for industrial processes protected by patents and trade secrets. The majority of these payments are reported by firms in the pharmaceutical industry. Although the data show overall that U.S. firms receive substantially higher royalty receipts from foreign parties than they pay out in unaffiliated transactions, for the pharmaceutical industry this pattern is reversed. U.S. pharmaceutical firms make substantially higher payments to foreign parties for industrial processes than they receive.

#### 4.4.2 Economic Census Data on Payments for the Use of IP

For the domestic economy, data on the industry structure and types of transactions for intellectual property are relatively limited. Receipts for IP-licensing service commodities, such as licensing and leasing of patents,

**Table 4.7** Economic Census Data on royalty receipts, 2002 (in millions of dollars)

Industry		Total royalties
		24,039
1. Publishing industries except Internet (511)		460
Sale or licensing of rights to content	460	
2. Motion picture and sound recording industries (512)		2,408
Royalties, license fees, and other payments for authorizing the use of musical compositions	1,665	
Receipts for sales, leasing, and licensing fees for master recordings	743	
3. Telecommunications (517)		5,207
Television program rights	5,207	
4. Internet service providers, web search portals, data processing services (518)		71
Sale or licensing of rights to content	71	
5. Other information services (519)		80
Sale or licensing of rights to content	80	
6. Lessors of nonfinancial intangible assets (533)		15,959
Oil and petroleum	366	
Patent leasing/licensing	7,761	
Franchise leasing/licensing	5,960	
Copyright leasing/licensing	1,490	
All other	382	
7. Management of companies and enterprises (551)		5,055
Sales, license fees, royalties, and other payments from the marketing of intangible property such as software, music, motion pictures, and other intellectual property	3,788	
Franchise sales and fees	1,267	
8. Performing arts, spectator sports, and other related works (711)		2,686
Amounts received from royalties, licensing fees, and residual fees from literary works, musical recordings and compositions, filmed entertainment, and other cultural works	2,686	
9. Museums, historical sites, and similar institutions (712)		46
Amounts received from royalties, licensing fees, and residual fees from literary works, musical recordings and compositions, filmed entertainment, and other cultural works	46	

*Source:* These royalty receipts are found in the 2002 Economic Census publications titled "Subject Series," and are drawn in each case from Table 1, Product Lines.

copyrights, and franchises, are only reported for a relatively small number of industries. For most industries, IP-licensing receipts are not separately reported in Census receipts.

Economic Census data are classified by industries based on the activity of the establishments rather than the activity of the enterprise; Census collects licensing receipts from the types of establishments considered most likely to receive them. These royalty receipts are shown in table 4.7 for

2002. The \$24 billion in Census-measured royalty receipts are received by establishments in four areas of the economy: information (51),<sup>8</sup> real estate and rental leasing (53), management of companies and enterprises (551), and arts, entertainment, and recreation (71). Census data identify the IP-licensing service commodities at varying levels of aggregation. For the establishment-based industry with the most royalty receipts, the intangible asset rental industry (533), product lines are identified based on type of intangible. Establishments in this industry collected \$7.8 billion dollars in receipts for the leasing and licensing of patents, \$6.0 billion dollars for the leasing and licensing of franchises, and \$1.5 billion for the leasing and licensing of copyrights.

Compared to the BEA international services trade data, Economic Census data show \$20 billion dollars *less* in royalties and licensing receipts, yet the scope of these transactions includes both domestic sales and exports. Several factors are responsible for this. In the Economic Census data, IP licensing receipts are separately reported for fewer types of IP. Data on these transactions in the Census data are only collected for a few industries and the establishments that actually collect royalties within large firms may not be receiving Census forms with these questions. Additionally, because Census data reflect measures of receipts, cross-licensing payments would be reported as net payments, while some cross-licensing may be reported as gross within the BEA trade data.

#### 4.4.3 Royalty Receipts from Corporate Tax Returns

Although Census provides royalty receipts for information and service industries, for statistical purposes that require a more comprehensive estimate of royalty income, the Internal Revenue Service's Statistics of Income (SOI) data from corporate income tax returns are sometimes used because they cover all industries. One place where this occurs is in BEA's Input-Output accounts, to measure the commodity output for the leasing of non-financial intangible assets.

Royalties are one component of income reported in U.S. Corporation Income Tax Return Form 1120, and SOI data for active corporations are estimated from a sample of these corporate income tax returns. For 2002 the returns of active corporations reported gross royalty receipts of \$115.9 billion dollars. Table 4.8 presents royalty income by industry sector and then sorted by magnitude of industry royalty receipts. All manufacturing industries together receive \$72.7 billion dollars in royalty income and three manufacturing industries make up 46 percent of the \$115.9 billion total, or \$53.3 billion dollars. These industries are computer and electronic product manufacturing, chemical manufacturing, and transportation equipment manufacturing.

8. The two-digit number in parentheses is the NAICS industry sector.

**Table 4.8** IRS royalties by industry and percent of total receipts from royalties, 2002 (in millions of dollars)

Sector		
Manufacturing		72,767
Distributive services <sup>a</sup>		13,112
Information <sup>b</sup>		13,463
Finance and insurance		2,362
Professional and business services <sup>c</sup>		6,654
Total royalty income from all industries		115,860
Average percentage of total receipts from royalties	0.59%	

Industry	Royalty receipts	Percentage of receipts from royalties (%)
Computer and electronic product manufacturing	23,317	4.3
Chemical manufacturing, including pharmaceuticals	20,482	3.1
Transportation equipment manufacturing	9,406	1.1
Publishing industries	4,755	2.2
Professional, scientific, and technical services	4,692	0.7
Beverage and tobacco product manufacturing	4,305	2.0
Food services and drinking places	3,564	1.3
Wholesale trade, nondurable goods	3,190	0.3
Machinery manufacturing	2,516	0.8
Motion picture and sound recording industries	2,422	2.8
Broadcasting, radio and television, cable networks, and program distribution	2,308	3.2
Electrical equipment, appliance, and component manufacturing	2,246	0.9
Building materials and garden equipment and supplies dealers	2,226	1.2
Fabricated metal product manufacturing	2,168	0.8
Miscellaneous manufacturing	1,996	1.1
Internet service providers, web search portals, and data processing services	1,952	2.4
Telecommunications	1,922	0.5
Food manufacturing	1,864	0.5
Accommodation	1,456	1.2
Food, beverage, and liquor stores	1,434	0.3
Administrative and support services	1,370	0.5
Wholesale trade, durable goods	1,365	0.1
General merchandise stores	1,350	0.3

*(continued)*

This IRS royalty income reported on the corporate income tax returns include foreign sources of royalties income, and for manufacturing industries, this foreign income is substantial. While data are not collected for the royalty and licensing component alone, SOI data reported for firms that report foreign tax credits indicate that the chemical manufacturing industry, for example, report \$9.1 billion dollars in combined foreign income for rents,

**Table 4.8** (continued)

Industry	Royalty receipts	Percentage of receipts from royalties (%)
<i>Other royalty-intensive industries</i>		
Paper manufacturing	923	0.6
Mining	923	0.6
Other transportation and support activities	805	0.6
Apparel manufacturing	641	0.9
Sporting goods, hobby, book, and music stores	482	0.6
Printing and related support services	481	0.5
Lessors of nonfinancial intangible assets	384	34.1
Educational services	215	0.8
Other information services	87	0.4
Leather and allied product manufacturing	68	0.7
Internet publishing and broadcasting	17	0.5
All other industries	8,526	

*Source:* Internal Revenue Service (2005), Statistics of Income—2002, Corporation Income Tax Returns, Table 6—Balance Sheet, Income Statement, Tax, and Selected Other Items, by Major Industry.

<sup>a</sup>Includes wholesale and retail trade and transportation.

<sup>b</sup>Includes publishing, software publishing, motion picture and sound recording, broadcasting, telecommunications, and Internet services.

<sup>c</sup>Includes computer system design and related services and scientific research and development services.

royalties, and licensing fees in 2002.<sup>9</sup> This income from foreign sources represents royalty income that is not in scope for either the Economic Census data or the BEA data on U.S. receipts of royalties and licensing fees, but the royalty component is not separable from the rents in the IRS data.

The right-hand column of table 4.8 presents the share of total U.S. corporate income tax receipts that are comprised of royalties. This gives an indication of the role of licensing of intangibles and intellectual property as a source of direct income. For all industries the average is 0.6 percent, with most of the higher shares coming from industries in the manufacturing and information sectors. The industry in the IRS data that receives the largest share of receipts from royalties is Lessors of Nonfinancial Intangible Assets (the intangibles rental industry). In 2002, according to the SOI data, this industry received 34 percent of its IRS reported income from royalties.

In the 2002 Economic Census data, establishments classified in this industry have receipts totaling \$16 billion dollars, while the IRS-based receipts total just \$384 million dollars. The IRS royalty income data, like the BEA service trade data, are collected on the basis of consolidated operations of the firm rather than by type of establishment; thus they only include *firms* classified in the Lessors of Nonfinancial Intangible Assets in-

9. IRS Table 2. U.S. Corporation Returns with a Foreign Tax Credit, 2002

dustry. The IRS-based receipts for this industry reflect receipts from corporations that identify their primary source of receipts as leasing of nonfinancial intangible assets; for example, the technology transfer firms discussed earlier. The \$16 billion dollars in the Census data represent establishments that may be attached to any industry but perform the economic activity of leasing the firm's intangibles and managing its intellectual property portfolio. This suggests that most of the Census receipts in the intangible asset rental industry (533) are collected in establishments that are part of other industries and exist to license the industry's intangibles, rather than in firms classified as in the intangible asset rental industry.

#### 4.5 Order-of-Magnitude Estimates

Piecing together information from each of these three Federal data sources, we can develop a composite picture of industry income from IP-licensing commodities. Both IRS data and BEA international services trade data are organized into industries based on the aggregated activity of the firm rather than establishments. The IRS data provide a broad total for each industry, and the unaffiliated component of international trade data provide information for an industry-based distribution of income across IP-licensing commodity types for international transactions alone.

The use of the industry-based distribution of income for unaffiliated transactions assumes that while differences in tax policies can affect the *volume* of royalties' transactions for particular countries' transactions, the distribution of these transactions across *types* of IP income from foreign residents is the similar to the distribution of domestic income across types of IP. In this case, the BEA data described earlier by type of intangible can be used to create a proxy distribution for royalties for each industry.

Although the arms-length nature of unaffiliated royalty transactions renders them less susceptible than affiliated transactions to tax-related distortions, unrelated firms have more at risk from a foreign licensee in terms of misappropriation of intellectual property than entities within the same multinational corporation. Substantively different institutional environments with respect to intellectual property could make the distribution of international royalties from unaffiliated transactions unsuitable for distributing domestic income into types of I-O licensing commodities.

The economics literature has produced mixed results on the relationship between international licensing and the strength of international property rights regimes.<sup>10</sup> Nevertheless, data show that the bulk of the international licensing transactions are not with countries with very different intellectual property rights regimes compared to the United States. Table 4.9 shows a five-point scale index on a set of minimum international standards for patenting rights from Park and Wagh for 2000, where the United States re-

10. See Park and Lippoldt (2004) for a review.



**Table 4.9 Patent rights index and the distribution of receipts for royalties and licensing fees from unaffiliated entities, 2002**

Countries	Index of patent rights**	Industrial processes receipts (in millions)	Use of industrial processes (%)	Distribution of receipts*				
				Books, records, and tapes, broadcasting and recording of live events (%)	Franchise fees (%)	Trademarks (%)	Other intangibles (%)	
All countries		4039	55.1	11.1	7.4	17.5	8.9	
Countries with index of 3.9 or above		3293	62.6	11.8	6.2	19.0	0.5	
Japan	4.19	1273	69.4	5.3	2.0	22.9	0.4	
Korea, Republic of	4.2	613	87.9	2.2	4.2	5.0	0.7	
Germany	4.52	389	71.1	14.8	5.7	8.4	near 0	
Taiwan	NA	336	89.8	2.9	3.2	4.0	0	
United Kingdom	4.19	236	47.6	21.2	10.7	20.6	0	
Other Europe	NA	199	51.8	14.6	10.9	20.3	2.3	
France	4.05	193	61.3	18.1	4.1	16.5	0	
Canada	3.9	138	34.5	19.0	15.0	31.5	0	
Switzerland	4.05	123	83.7	7.5	1.4	7.5	near 0	
Italy	4.33	101	45.9	21.8	8.6	21.4	2.3	
Belgium-Luxembourg	4.04	49	59.0	8.4	7.2	25.3	0	
Mexico	2.86	40	30.3	21.2	13.6	34.8	0	
Sweden	4.38	40	38.8	15.5	7.8	37.9	0	
Australia	4.19	37	32.7	22.1	12.4	32.7	0	
China	2.48	33	47.1	8.6	5.7	30.0	8.6	
Singapore	4.05	28	63.6	4.5	15.9	11.4	4.5	

Netherlands	4.38	26	40.6	32.8	6.3	20.3	0
Other Western hemisphere	NA	19	35.8	13.2	35.8	15.1	near 0
Indonesia	2.27	19	57.6	6.1	27.3	9.1	near 0
Hong Kong	2.9	18	29.5	8.2	26.2	36.1	0
Israel	4.05	16	35.6	22.2	15.6	13.3	13.3
Other Asia and Pacific, except Taiwan	NA	13	25.0	7.7	46.2	21.2	0
South Africa	4.05	13	43.3	23.3	13.3	20.0	0
Thailand	2.24	13	50.0	7.7	19.2	23.1	near 0
India	2.18	13	61.9	4.8	4.8	28.6	near 0
Other Middle East	NA	12	23.5	5.9	51.0	9.8	9.8
Spain	4.05	11	13.4	36.6	20.7	29.3	0
Brazil	3.05	10	23.3	46.5	4.7	25.6	0
Other Latin America	NA	6	9.1	22.7	28.8	39.4	0
Saudi Arabia	NA	5	13.2	5.3	26.3	7.9	47.4
Venezuela	2.9	5	15.2	42.4	12.1	30.3	0
New Zealand	4	4	20.0	45.0	20.0	15.0	0
Norway	3.9	3	14.3	19.0	42.9	23.8	0
Other Africa	NA	3	21.4	7.1	50.0	21.4	0
Chile	3.41	2	10.5	36.8	15.8	36.8	0
Argentina	3.33	1	10.0	40.0	10.0	40.0	0

\*This distribution reflects the use of the data for allocating IRS receipts, and excludes the receipts for general-use software because the IRS royalties are assumed to reflect passive income. Data are from BEA's International Investment Division, available on the BEA website as U.S. International Services: Cross Border Trade, 1986-2004; Table 4, Royalties and License Fees 1986-2004, collected on BE-577 for transactions between U.S. parents and their foreign affiliates and the BE-605 for transactions between U.S. affiliates and their foreign parents. \*\*Index of Patent Rights for 2000, from Park and Wagh.

ceives five points. The table is sorted from highest to lowest by the value of IP-licensing receipts for the use of industrial processes protected by patents and trade secrets; countries with an index ranking of 3.9 or above provided 80 to 90 percent of these receipts. This suggests that the potential for distortion in the distribution of types of IP based on differences in IP regimes is minimal.

Under the working assumption that international demand for IP-licensing commodities is similar to domestic demand, table 4.10 presents order-of-magnitude estimates by industry sector and IP type that show the supply of four IP-related service commodities, based on the totals from IRS corporate royalty receipts. The industry totals are directly from the IRS data on U.S. corporate royalty income. The distributions across types of intangible are based on the available Census data, the distribution of BEA royalty and licensing receipts from unpublished data aggregated to match the IRS industries, and estimates based on franchise industry data. Greater detail on the estimation procedure is provided in the Appendix.

Table 4.10 shows that the manufacturing sector receives the vast majority of all licensing receipts for the right to use IP for industrial processes protected by patents and trade secrets. The largest recipients are the chemical manufacturing industry and the computer and electronic product manufacturing industry. Industries in manufacturing also receive substantial receipts for the use of both trademarks and franchises. Both of these are in large part received in the beverage manufacturing industry. For the distributive services sector, the largest share of IP-licensing service commodity receipts are from the use of trademarks and franchises. Within distributive services, retail trade receipts are divided between trademarks and franchise receipts, and wholesale trade receipts are predominantly trademark related and are earned by apparel wholesalers and grocery wholesalers. Within professional and business services, the scientific research and development services industry receives a large share of the licensing receipts for the use of IP protected as industrial property. Within the "other industries" category, franchise-licensing receipts are particularly substantial for accommodation and food service industries.

How reasonable are these order-of-magnitude estimates? Arora, Fosfuri, and Gambardella (2002) estimate the average value of the global market for technology licensing and related transactions at \$36 billion dollars a year in the 1990s, a value they suggest is likely an underestimate. They note that available estimates for the late 1990s, including Degnan (1998), are in the range of \$35 to \$50 billion dollars. The method used in this paper for 2002 produces estimates for U.S. corporate supply of IP-licensing of industrial processes at \$27.4 billion dollars for 1995, \$29.4 billion dollars for 1996, and \$31.8 billion dollars for 1997.

While these estimates are in the range of others, to account for the foreign component of the IRS corporate income, the estimates should be ad-

**Table 4.10 Order-of-magnitude distribution of IRS receipts for types of IP-licensing service commodities across industry sectors, 2002 (in billions of dollars)**

Sector	Licensing of rights to use IP protected as industrial property	Licensing of rights to use IP protected by trademarks	Licensing of rights to use IP protected by copyright	Licensing of rights to use a business format under a franchise	Payments for rights to use natural resources and other intangibles	IRS royalties total
Manufacturing	59.5	9.4	1.0	2.9	—	72.8
Distributive services (wholesale, retail, and transportation)	1.0	6.9	0.1	5.1	—	13.1
Information	1.9	4.9	6.6	0.0	0.1	13.5
Finance and insurance	0.2	0.7	0.0	1.4	0.0	2.4
Professional and business services	3.0	0.2	1.6	1.5	0.4	6.7
Other industries	1.0	0.7	0.1	4.8	0.8	7.5
Total	66.6	22.8	9.4	15.7	1.3	115.9

justed downward to reflect income earned domestically. Because the only available information for the adjustment, data on firms reporting foreign tax credits, combines royalty incomes with rents, the exact proportion due to royalties is not estimable. An order-of-magnitude adjustment is made using the ratio of royalties to rents in the total U.S. corporate income; roughly 20 percent of U.S. royalty income is attributed to foreign sources. This twenty percent adjustment leaves order-of-magnitude estimates for domestically earned corporate income of approximately \$50 billion dollars for licensing of industrial property, \$20 billion for licensing of trademarks, and \$10 billion each for the licensing of copyrights, and franchises.

In terms of the distributions, the results from one of the questions on a 2003 survey of intellectual property managers by Cockburn and Henderson (CH 2004) can also be used for comparison purposes, and suggest that the distribution of the order-of-magnitude estimates are also in the right range. The IP managers were asked to estimate the fractions of total monetary value represented by their different IP assets, and the distribution was as follows: patents, 44.5 percent; trade secrets, 15.7 percent; copyrights, 8.8 percent; trademarks, 18.2 percent; know-how, 13.9 percent.<sup>11</sup> The approximations in table 4.10 of IP-licensing receipts (excluding payments for natural resources and other intangibles) are distributed similarly. The share represented by industrial process licensing (patents and trade secrets) represents 58.1 percent of the total, compared to 60.2 percent in the CH survey for patents and trade secrets; copyrights represent 8.2 percent of the total, compared to 8.8 percent in the CH survey. The comparison for trademarks is 19.9 percent compared to 18.2 percent in the CH survey. On the whole this evidence suggests that the IP-licensing commodity distributions are in the right order of magnitude.

#### 4.6 Summary and Conclusion

Using a variety of sources, broad estimates of IP-licensing transactions have been presented for 2002 using a product classification for IP-licensing commodities. The allocation method is simple and relies on the assumption that industries sell the same bundle of IP-licensing commodities domestically that they sell internationally. The analysis shows that manufacturing firms are important suppliers of IP-licensing commodities.

In the year 2002, U.S. corporations reported \$115.9 billion dollars in royalty income to the IRS, and about \$67 billion dollars of this was earned for the use of industrial property protected by patents and trade secrets.

11. They had eighty-one usable surveys from managers of intellectual property and reported that 44 percent of these identified their corporations as IT and communications, 22 percent from the chemical industry, 14 percent from life sciences, 16 percent from mechanical sectors, and less than 7 percent from financial and service sectors. This total slightly exceeds 100 percent, as do the shares of IP assets, likely due to rounding and some respondents not claiming all types of IP assets.

Existing data sources do not allow the domestic component of this royalty income to be separately measured by industry, either at the firm or the establishment level. Using simple allocation methods we estimate that the domestic component of this corporate income is approximately \$50 billion dollars for licensing of industrial property, \$20 billion for licensing of trademarks, \$9 billion for the licensing of copyrights, and \$10 billion for franchises.

These order-of-magnitude estimates provide a preliminary indication of the role of market transactions for IP licensing in the economy. The estimates were created using broad distribution ratios to allocate royalty and licensing income into the categories of information that would be analytically useful, but are no substitute for comprehensive survey data. The sector and commodity presentation indicate the kinds of information that would provide quantitative measures of innovation and the value of intangibles, as well as improve the accuracy of the national economic accounts.

Data improvements in many areas will be needed in order to develop more precise estimates and to more fully measure the role of intangible investments in the economy. For expenditures on scientific R&D and some additional information on industrial process-related transactions, a substantial redesign is underway at the National Science Foundation for business R&D activity. For other intangibles, such as artistic and entertainment creations, comprehensive data are not yet available to estimate the scope of this investment.

By improving the collection of data for the observable, market transactions in the domestic economy for the use of intangibles that are protected as intellectual property and thus earn royalties and licensing fees, we can get a much clearer picture of the role of intangibles in economic growth. The taxonomy used in this chapter parses intangibles by type of IP protection and allows for improved estimates of industry output.

What else is needed?

- A clear separation of receipts for the purchase of intangibles and intellectual property from receipts for the use of these assets.
- Broader measurement of receipts for the use of IP by industry within the domestic economy.
- Separate accounting of industry expenses for the use of IP from other business expenses.
- Data on the estimated value of cross-licensing agreements and greater transparency about whether reported licensing receipts reflect net or gross flows.
- Better identification of copyright and patent royalties and licensing fees that are for the right to reproduce computer software programs.
- Improved price indexes for IP-licensing commodities.

More accurate accounting will likely require enterprise-based surveys that focus directly on the creation of IP assets and transactions for their

use, including cross-licensing. This kind of information would resolve a great deal of the ambiguity surrounding the estimates of unmeasured components of economic activity and provide a means to trace technology flows across industries. For economists and policymakers interested in understanding the impact of intangibles on the economy, improved measurement is the essential next step.

## Appendix

### *Methodology for the Order-of-Magnitude Estimates*

Internal Revenue Service reported royalties are assumed to be a combination of (a) licensing of rights to use IP protected as industrial property by patents and trade secrets, (b) licensing of rights to use IP protected by trademarks, (c) licensing of rights to use IP protected by copyright, (d) licensing of rights to use a business format under a franchise, and (e) royalties for the use of natural resources. The BEA data on international royalty transactions for unaffiliated entities cover a somewhat different spectrum of intangibles and are adjusted before being used to infer the distribution of IP-licensing commodities. Six of the seven types of intangibles covered in the BEA data match the available definition of scope of the IRS royalties. The IRS royalties are assumed to be primarily passive income rather than payments for a service or a good, and are assumed to exclude electronically transmitted software as well as end-user license fees for shrink-wrapped software. The BEA international transactions data for royalties and licensing fees category includes a category for both the rights to reproduce software and for the general use of electronically transmitted software. While the rights to reproduce software are clearly within the scope of the IP-related service commodities, the latter use is more closely aligned to the licensing of software for end use as a final expenditure and more likely to be the majority of the payments and receipts. Excluding computer software licensing, receipts for royalties and licensing fees for the use of industrial processes makes up 55.1 percent of the unaffiliated royalty receipts for 2002 (calculated from data shown in table 4.4).

The distribution of IP-licensing commodities by industry is based on Census data where it was available, franchise royalty estimates, and the distribution of the BEA international receipts. The IRS-based royalties were allocated by type of IP, using BEA international receipts for the purchase and use of intangibles.<sup>12</sup> For industries without international transactions,

12. In a related exercise, Degnan (1998) used the IRS industry distribution of royalties to parse out the likely industry distribution of unaffiliated receipts. This paper estimates types of IP-licensing commodity by industry.

mostly in the service industries, royalties were evenly split between trademarks and franchise royalties. Payments for the right to use natural resources are combined with “Other Intangibles,” a category that includes spectrum rights for broadcasting. This category represents payments for the use of non-IP intangibles. All IRS royalties in agriculture and utilities were attributed to natural resources as were a large share of mining royalties.

### Estimating Franchise Licensing Fees

Royalties for the use of business format franchises are estimated for this chapter with data on total industry receipts, the share of total industry receipts represented by franchisee-operated establishments, and average annual royalty payments. Where data are not available from Federal statistical sources, data from the franchise industry are used.<sup>13</sup>

For Food Service and Drinking Places, the franchisee share of the industry is available in the 2002 Economic Census. Using the franchisee share of industry receipts for full and limited service restaurants and industry association royalty rates yields an estimate of \$3.2 billion for 2002.<sup>14</sup> This estimate is relatively close to the IRS reported royalties for this industry—\$3.6 billion, and suggests that most of the IRS royalties for this industry can be attributed to domestic franchise royalties.

For the Accommodation industry, using franchise industry estimates of the share of the industry represented by franchisee-owned businesses and the average royalty rate, the Accommodation industry (NAICS 721) received franchise royalties of about \$1.2 billion in 2002.<sup>15</sup> This compares to an IRS royalty receipts total of \$1.6 billion for NAICS 721, Accommodation.

13. A summary of royalty fees developed from the Uniform Franchise Offering Circulars that twelve states require for business format franchise offerings is combined with information on the share of industry payroll in establishments that pay franchise royalties. Because the published level of industry aggregation of the data is not particularly detailed, this information is most useful for Food Service and Drinking Places and Accommodation, the two industries with very large royalty receipts.

14. 2002 Economic Census, Sector 72, Accommodation and Food Service, Miscellaneous Subject Series Table 7. Frandata Corporation (2000) provides annual royalty rate estimates of 4.2 percent for full service restaurants and 4.7 percent for limited service restaurants as part of its royalty analysis in the Profile of Franchising. For more information on franchise royalty structure, see pages 122–51. Because the initial study was created for 1998, Frandata provided the author with updated royalty rates for 2004, and the rates were averaged to create a usable royalty rate for 2002.

15. Economic Impact of Franchised Businesses (EIFB), Price WaterhouseCoopers (2004), these data were created for 2001. A reality check for Full and Limited Service Restaurants suggests that the EIFB numbers are in the right range; EIFB suggests that 10.8 percent of payroll for full service restaurants was in franchise-operated establishments. The Census ratio based on receipts is 12.4 percent. For limited service restaurants the EIFB ratio is 44.3 percent and the Census ratio is 43.9 percent. These EIFB estimates are based on three sources: U.S. Census's County Business Patterns, Nonemployer Statistics, and the IMPLAN model.



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## Comment C. Fritz Foley

Understanding the functioning of the U.S. and global economy increasingly requires understanding how intellectual property (IP) is developed and deployed. Industries that intensively use intangible assets make up a large and growing share of U.S. industrial activity. These types of assets also play a significant role in determining the productivity of U.S. firms and

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