Internationalization of Intangibles*

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> "National industries and national trade act and react on one another, but the dominant force is that of industry. The main courses of trade are governed by the relations between the surrounding industries, in the same way as watercourses are governed by the contours of the hills . . . . But the water reacts on the hills and trade reacts on industry; the industrial history of any country would have been different if her opportunities for foreign trade had been different."
>
> Alfred Marshall 1919, *Industry and Trade Vol. I* (p. 4)

The global competitiveness of U.S. industries and companies, including supply chains that feed and service them, is central to maintaining and growing high standards of living the United States. Emerging countries are expanding many times faster than advanced ones, and competing for global demand is the "new normal" of business. The structure of U.S. industries in the years ahead—their production capacities and types of workers employed—will in turn be shaped by strategies companies use in the global competition (just as "water reacts on the hills and trade reacts on industry" in the words of Marshall nearly a century ago).

The main objective of this paper is to review the implications of the intangible capital literature and globalization for the U.S. international accounts and BEA's data on U.S. multinational corporations. We find the BEA MNC operations data a rich source of information on global economic activity and that the U.S current account is not seriously misstated owing to large and growing international flows of intangible assets. The same cannot be said of the U.S. net direct investment position; reported estimates miss most intangible assets and evidence suggests that the U.S. outward position exceeds the inward position.

Facts about U.S. MNCs and international trade

Ninety-five percent of the world's population lives outside the United States. A U.S. company can venture into the vast global marketplace and build a foreign customer base through exports, or it can set up affiliates and serve foreign customers through direct sales abroad. No single

strategy is appropriate for a company. And as pointed out by Slaughter (2013), many companies do both, with the mix of exports and affiliate sales differing widely across multinational firms headquartered in the United States (U.S. MNCs). The relative importance and growth of affiliate sales for this group of businesses, however, is extremely striking—U.S. MNC affiliate sales were 6-1/2 times larger than the value of goods exported by U.S. MNC parent operations in 2010 according to Slaughter's analysis of BEA data. This is up from factor of 4 in 1999, and is an even more notable rise when one considers that exports have grown faster than U.S. GDP during this period *and* that the share of total goods exports accounted for by these companies was 45 percent in 2010. Both total exports and goods exports as a share of U.S. GDP stood at historic highs in 2011 and 2012 (13.9 percent and 9.8 percent, respectively).

Exports by affiliates of foreign-owned MNCs located in the United States account for another large chunk of U.S. goods exports (18 percent in 2010[1]). As most MNCs are large firms, it is then perhaps unsurprising that research exploring linkages between firms and their flows of exports and imports finds that *trade is extremely concentrated* across firms—the top 1 percent of trading firms (ranked by trading value) accounted for 80 percent of trade, and the top 10 percent accounted for more than 95 percent (Bernard, Jensen, Redding, and Schott 2007). Furthermore, these top firms tend to ship a large number of products to a large number of destinations, suggesting U.S. trade grows along extensive margins, *i.e.*, by a small number of firms adding products and geographies to existing sales mixes.

Intangible capital and globalization

Recall first that the literature on intangible capital broadens the concept of private investment to treat most spending on databases, R&D, design, brand equity, and organizational capital (including firm-specific training) as business investments (Corrado, Hulten, and Sichel 2005; see figure 1). When U.S. business investment is expanded to include intangible investments, the resulting total is nearly twice as large using data since 2000 (see figure 2), and the growth of intangible capital is found to account for more than 25 percent of U.S. labor productivity growth (Corrado, Hulten, and Sichel 2009; Corrado and Hulten 2010, 2012).

[1] Correcting for double counting in instances where a U.S. parent is also a foreign parent yields a somewhat smaller estimate.

At last count, the so-called CHS method for modeling intangible capital and analyzing its role in economic growth has been applied to the majority of OECD countries and some emerging ones as well.[2] The literature on the comparative analysis of intangibles finds that businesses in the United States have a higher propensity to invest in intangible capital than businesses in other advanced countries; see figure 3 and the discussion in van Ark, Hao, Corrado and Hulten (2009) that links this propensity to innovation and productivity performance.

Intangible investments are mainly investments in innovation, as they encompass investment in new products and processes, including organizational development. The analysis of intangible investment and capital focuses almost exclusively on domestic supply and production within a country because so much of this type of investment occurs "in-house" i.e., intangible investments are produced on own-account (the term of art for non-market production in national accounts). A key feature of innovation is that the knowledge (intangible capital) produced by innovation investments is partially non-rival and a source of market power (Romer 1990). The implications of these characteristics are typically considered in the context of firms in competition against one another, but a different and equally relevant context is within the MNC.

The ability of the MNC to extend the useful life and appropriability of its past investments in R&D, brands, and organizational know-how through global expansion places a different slant on the analysis of intangible capital and global knowledge diffusion. Exploring this topic is the main subject of this paper. When thinking about the relationships among intangible capital, MNCs, and international trade, then, several questions naturally arise:

- Do international services trade figures capture all relevant payments to, flows of, and investments in knowledge capital?
- Is the "tilt" toward intangible investment in figure 1 a phenomenon of globalization? A reflection of an economy supported by repatriated incomes from overseas investment, or a reflection of a domestically oriented services economy?

[2] [OECD citation]

The upward tilt in figure 1 is associated, at least in part, with the IT revolution based on evidence that intangible capital and IT capital are complements in production.[3] And IT can further be said to have enabled globalization. But we cannot begin to get at the possible relevance for policy of the increase in globalization and the trend towards intangible capital without knowing whether international accounts adequately represent flows of knowledge capital. Understanding the internationalization of intangibles then is necessary to gain a better understanding of the income-generating mechanisms of modern globalized economies, the nature of which are a central subject in the current policy debate.

Previous literature

The literature has addressed the subject of whether international accounts adequately capture flows of intellectual property and intangible capital, but the findings are not dispositive.

McGrattan and Prescott (2009, 2010) introduced "technology capital" owned by MNCs into the neoclassical model of growth to evaluate concerns of high U.S. current account deficits. In their model, technology capital is the stocks of knowledge arising from past investments in R&D, brands, and organizational know-how, i.e., intangible capital. The expensing of investment in intangible capital leads to differences between the reported and "true" balance of payments and between reported and "true" net asset positions in their model. Calibrations of the model implied smaller true current account deficits and a much larger true U.S. net asset position—as much as 20 percent larger than the reported position (in the late 2000s). On the basis of the model's predictions, they concluded there was "no current account problem" that policy-makers needed to address.

In related work Bridgman (2008) looked at the gap that exists in returns to direct investment in BEA data, namely, that outward direct investment abroad (DIA) earns substantially higher returns than inward foreign direct investment (FDI). Many researchers have advanced

[3] Microeconomic evidence demonstrates that co-investments in software, training, and organizational change are necessary for the adoption of ICT equipment to convey competitive advantage (Bresnahan, Brynjolfsson, and Hitt 2002; Brynjolfsson, Hitt, and Yang 2002). At the macroeconomic level, using a new cross-country dataset of intangible investment in European countries, Corrado, Haskel and Jona-Lasino (2013) find strong complementarities between industry ICT intensity (including software) and intangible capital (excluding software).

explanations for this puzzle, and Bridgeman suggests it may be attributed to differential taxation of MNCs and their intangible capital. This line of work is important, as taxation is a possible determinant of the patterns seen in figures 1 and 2. Especially germane is Bridgman's after-tax ROR analysis that suggests intangible assets are a "first order source of the FDI returns gap" and that U.S. MNC firms devote relatively more of their investment to (unmeasured) intangibles while foreign firms investing in the United States devote relatively more to (measured) tangible assets. The model used to generate to these conclusions is essentially identical to McGrattan and Prescott's model.

As a final note, when McGrattan and Prescott, Bridgman and we in this paper refer to intangible capital of MNCs and international flows of knowledge capital, the reference is to processes that encompass, but are not limited to, what has been called "technology transfers" and international knowledge flows in the R&D literature. The R&D literature on technology transfers considers the relevance of international flows of knowledge capital (which they usually estimate from trade data) for global technology diffusion and productivity growth, an important and related subject but nonetheless tangent to this paper.

U.S. international R&D and intangibles

BEA's results on U.S. international R&D seem at odds with the above-mentioned findings from the intangible literature. As part of work on the BEA/NSF's R&D Satellite Account, Yorgason (2007) of the BEA evaluated the impact of capitalizing international R&D flows. He obtained a *negligible* impact of capitalization on the current account and a slightly *lower* US net direct investment position in 2004. The effects of treating MNC R&D as investment on total capital stocks and value added of MNCs were of course more consequential, an unsurprising finding given that MNCs (U.S. and foreign-owned) located in the United States account for 80 percent of U.S. R&D (2004).

The finding of a lower US net direct investment position occurred because the *increase* in the inward position was larger than the *increase* in the outward position (i.e., the increase in R&D stocks based on R&D conducted in the United States by foreign-owned MNCS was larger than the corresponding stocks generated by R&D conducted abroad by affiliates of US-headquartered MNCs).

There are a couple of points to make with regard to the BEA findings on the capitalization of international R&D. First, the inward R&D flows may be overstated in BEA's data, as considered by the panel on R&D and innovation statistics commissioned by the National Academy [reference]. Second, McGrattan and Prescott parameterized their model in a way that precluded the relative importance of inward stocks—that the direct position may be understated because of uncounted outward flows of "dark matter" was the premise of their model and their work. That said, both our figure 3 and Bridgman's work suggests that the Academy panel and McGrattan and Prescott are *both* more or less correct, namely that outward flows of U.S. intangible capital are likely much larger than inward flows, say, from Japan and continental Europe, the major geographies with direct investments in the United States.

Framework for analysis

Consider intangibles within MNCs using the framework introduced in Corrado, Hulten, and Sichel (2009) for the macroeconomic analysis of intangible capital. The framework is summarized in the box on the following page, which has been taken from Corrado, Haskel, Jona-Lasinio, and Iommi (2012). "Downstream sector" and "upstream sector" are understood here to be functions within MNCs—i.e., let downstream be operations and upstream be R&D and marketing. With these terms and definitions in mind, consider data for the illustrative MNC as laid out in figure 4.

<these points will be explicated more fully in the next draft of this paper>

1. Rows 1-8 of column labeled "FIRM X total" are income and cost items often contained in MNC corporate reports. Row 12 (employment) is also often reported.
2. Taxes are ignored.
3. The allocation or royalties in line 9 across countries is recorded as if R&D assets were fully licensed to the own company and fully "responsible" for the MNC profits. This allocation is arbitrary; a different allocation would not have an impact on MNC profits.
4. Services listed on line 10 are the items BEA asks for in its trade in services survey, where it collects payments for current services (say, R&D services) performed by one entity (firm X's R&D lab) on behalf of another (MNC headquarters) located in another country.

Box 1. Innovation and Intangibles – Defining Terms and Approach

Consider a model of the economy based on Corrado, Hulten, and Sichel (2009), as set out in more detail in Corrado, Haskel, and Goodridge (2012) with just two industries/sectors: (a) an "innovation sector" or upstream sector that produces knowledge and (b) a "production sector" or downstream sector that uses the knowledge produced by the upstream sector to produce "final output".

Assume further that the upstream sector uses "basic" ideas for free, e.g. from universities, and uses them to produce "finished" ideas or commercial knowledge, e.g., blueprints that can be licensed to users. Let the newly produced commercialised knowledge have the value $P^N N$ and the per period licensing fee users must pay to use the stock of this knowledge R be $P^R R$ (so that purchasing a unit of knowledge costs P^N whereas renting a unit of knowledge costs P^R per year). This implicitly assumes that the upstream sector can, at least for some period, appropriate returns to its knowledge, and so this model is identical to Romer (1990) (where patent-protected knowledge is sold at a monopoly price to the final output sector during the period of appropriability). The downstream sector does not produce knowledge or information, but rather consumption and investment goods whose value is given by $P^Y Y_t = P^C C_t + P^I I_t$. The downstream sector must pay, however, for the knowledge and information produced by the upstream sector to accomplish this production. Thus the downstream sector is assumed to be a price-taker for knowledge; by contrast the upstream sector has *market power* (via patents or business secrets).

With these assumptions in hand, we are in a position to write down the production functions and factor payment equations for the two sectors as follows:

$$N_t = F^N(L_t^N, K_t^N, R_t^N, t^N); \;\; P_t^N N_t = \mu(P_t^L L_t^N + P_t^K K_t^N)$$

$$Y_t = F^Y(L_t^Y, K_t^Y, R_t^Y, t^Y); \;\; P_t^Y N_t = P_t^L L_t^Y + P_t^K K_t^Y + P_t^R R_t^Y$$

On the left of these equations are the production functions describing how inputs are transformed into outputs. The production functions have three factors of production, stocks of labor L, stocks of tangible capital K, and stocks of knowledge R, superscripted by N or Y depending on sector of usage. The term t captures anything that shifts the production function but is costless e.g. free knowledge or inspiration. On the right of these expressions are the factor payment equations that describe the payments to the factors of production. In the factor payment equations, factor prices P^L and P^K are competitive for services supplied, per unit of labor and capital input, respectively.

In the upstream factor payments equation, there are no payments for basic knowledge R^N, because its services are assumed free and quantities are determined outside the model. The parameter $\mu \geq 1$ measures upstream *market power*, the "innovator" markup over competitive factor costs of inputs used up in the innovation process. The downstream payments equation shows the downstream sector pays to use the knowledge stock. The stock of commercial knowledge R^Y is the accumulated output of upstream production N, which grows via the perpetual inventory relation: $R_t^Y = N_t + (1-\delta^R)R_{t-1}^Y$ where the term δ^R is the rate of decay of appropriable revenues from the existing stock of commercial knowledge. An analogous equation determines the stock of physical capital: $K_t^Y = I_t + (1-\delta^K)K_{t-1}^Y$. Pakes and Schankerman (1984) discuss the depreciation of knowledge for he case of private R&D. They point out the deprecation of physical capital is well established and commonly thought of as *physical decay*: that is, a decline in the ability to render capital services due to wear and tear. It is then sometimes asked how such a concept can be applied to *intangible* capital, given that it is unlikely to wear out. However, this is not the right interpretation of the term. What is required is a measure of how the value of intangible capital declines because (a) new ideas are invented that make old ones obsolete (or ideas "leave" the firm if they are embodied in departing workers) and (b) firms cease to appropriate benefits as it is copied by competitors (e.g., via patent expiry). These considerations suggest the appropriability of knowledge decays very fast, the polar opposite of the "wear and tear" idea that it does not decay at all.

5. Intangible investment on line 11 applies the CHS capitalization factors to line 10 to obtain intangible investment. [see box 2 for more information on how intangible investment is estimated.]
6. BEA's survey also collects information on royalties and license fees, both between unaffiliated parties as well as between affiliates of MNCs.
7. All production is located country B, say in a factory designed by MNC engineers located in country C. No license fees for the industrial processes used in that factory (i.e., fees for its "blueprint") are shown in the tableau. At some prior point then, the value of transferring that blueprint to its affiliate in country B may have appeared in line 9 (as an export by C to B).

The MNC data tableau and interpretation were deliberately kept simple, but consider further the last point that was made (item 7). At one level non-rivalry in the MNC context simply implies scalability of operations across geographies at low cost (X can set up shop in 5 other countries just as it did in country B). What this implies about how knowledge transfers need to be recorded in international accounts is not clear, however.

A simple example illustrates the conceptual accounting difficulty that *can* arise with regard to intangibles. Suppose firm X spent $2 billion to generate process Z that they previously used in country C but are now using in country B. Assume further that the value of Z does not depreciate. Assume further that when X sets up shop in country B, it is with 100 percent ownership of the operational affiliate, and X still has the ability to use process Z anywhere in the world. Because X does not legally "transfer" Z to its affiliate in country B there is no international payment and no change in ownership. The latter may be said to be "dark matter" (capital of country C "transferred" to county B without footprints in international accounts) but it is not clear that something should be done about it (in ownership based accounting). Note further that when X's competitors in country B mimic Z's processes (plant layout, supply logistics, etc.), it clearly is not "dark matter" but rather diffusion of know-how (aka multifactor productivity in country B).

Now, assume lawyers, payments for Z, and property rights are involved in the setting up of the operations in B. There are many possibilities here, but whatever the details assume the result is

Box 2. Estimating nominal investment in intangible assets

An estimating equation for nominal expenditure was set out in Corrado et al. (2012) as:

$$
\begin{aligned}
P^N N_t &= \sum_{j=1}^{J} \mu_j (P^L L_{j,t} + P^K K_{j,t} + P^M M_{j,t}) \\
&= \sum_{j=1}^{J} \mu_j^{shadow} (P^L L_{j,t} + P^K K_{j,t} + P^M M_{j,t})^{own-account} + P_j^N N_{j,t}^{purchased} \\
&\cong \sum_{j=1}^{J} \sum_{s=1}^{S} (\mu_{s,j}^{shadow} (P^L L_{s,j,t} + P^K K_{s,j,t} + P^M M_{j,t})^{own-account} + P_j^N N_{s,j,t}^{purchased}) \\
&= \sum_{j=1}^{J} \sum_{s=1}^{S} (\mu_{s,j}^{shadow} \gamma_{s,j}^{own-account} \lambda_{s,j} OwnCost_{s,j,t}^{Indicator} + \gamma_{s,j}^{Purchased} Purchased_{s,j,t}^{Indicator})
\end{aligned}
$$

where the terms in the first line were introduced in Box 1 except now we show intermediate inputs because accounting for them is important for the estimation of production on own-account.

The second line shows that one needs to account for both purchased and own account and should, introduce a margin to place both on the same footing. The third line underscores the needs to build up estimates by sector or industry. The discussion in this report is in terms of domestic business activity.

The estimating relationship is on the final line, which acknowledges we may have imperfect data on factor inputs when we wish to measure own account spending, and also imperfect data on purchased investment services. The variables superscripted "indicator" are the indicators based on available data; for instance, the indicator may be wages or compensation for investment on own-account.

The λ parameter indicates the adjustment to the own-account indicator that is needed to transform it to gross output. This parameter can be, itself, a product of other parameters -- fraction of employee time devoted to the task that is being measured, markup factor to account for the use of materials, and/or markup factor to account for the use of capital services. The latter may be sufficient to place the final result on the same footing as purchased services, in which case it is plausible to set the innovator markup μ to one.

The γ parameter is the capitalization factor, namely, a parameter that adjusts a spending indicator to a measure of investment.

joint ownership of Z by headquarters in C and affiliate in B. Firm X (cum affiliate in B) still owns Z, still has the ability to use process Z anywhere in the world, but a genuine accounting issue arises due to the non-rivalry of Z. As expressed by Yorgason (2007) the problem is that the domain of measurement—the country—does not encompass the unit across which ownership of Z is shared—the MNC. There simply is no clean way to allocate *jointly held* MNC intangible capital Z without artificially impacting country C's national wealth and sources of growth calculations.

How much U.S. MNC intangible capital is jointly held? We do not know. But what we do know is that to the extent that international transfers of knowledge occur *in forms protected under law*, either by outright transfer for payment or through license agreements, they are recorded in BEA's surveys in the category royalty and license fees. The values of this service trade category relative to estimates of intangible capital from our earlier work are shown in figure 5. Note that our earlier work made no allowance for international transfers of the ownership (except implicitly through the high rates of depreciations that were assumed).

As may be seen, the intellectual property trade flows are much, much smaller than our estimates of intangible capital, which averaged $4.8 trillion from 2007-2011. Looking at the export ratio, which represent receipts from foreign entities for purchases of, or rights to use, U.S. intellectual property, note that there are good reasons to expect a small number: First, intellectual property rights (IPRs) protect only a portion of intangible capital in the United States; this is illustrated in figure 6, the details of which we shall not discuss. Although we have no hard estimates of the portion of U.S. stocks that are legally protected, estimates for the United Kingdom put the protected portion at about 50 percent (Goodridge and Haskel 2010 [get correct citation]).[4]

Second, as just noted, IPR-related trade flows mix payments for purchases of capital with payments to rent or license it. As the latter are a rental rate times a value of a stock, they are but a fraction of the value of the stocks involved (25 percent, say). For these reasons, even if all U.S. intangible capital were sold or licensed to foreign entities, we would have a ratio of payments to value of the stock that was very much under one (to be illustrative, suppose 50 percent of U.S. intangible stocks were sold and 50 percent were licensed; using the 25 percent rental rate and applying the 50 percent UK ratio to both yields .31). All told then, the ratio is small but rising, suggesting that IPR-protected U.S. intangible capital is being deployed in foreign production at an increasing rate.

Intangibles in international accounts and trade in services data

Capitalization of an expense such as R&D touches three parts of international accounts: (1) trade in services (2) investment income, and (3) investment positions. Using the notation and

[4] These estimates are based in part on information from the U.K.'s Community Innovation Survey, for which no comparable information is available for the United States.

definitions set out in box 1 (and ignoring geographic distinctions), we review the impacts of R&D capitalization, part by part. We then assess implications for the capitalization of all intangibles.

Starting with (3), the investment positions in intangible capital are the values of inward and outward stocks at current/replacement cost, $P^N R^Y$. When intangibles are capitalized, these values are added to the existing outward and inward positions, respectively, and the final change to the net direct investment position is the net of the two intangible stocks.

For investment income (2), two changes occur with capitalization: First, the expenses that were previously deducted are added back to income. Second, depreciation charges for newly recognized assets are now deducted. Assuming expenses are on own-account and valued at cost (equivalently, in the terminology of box 1, we let $\mu = 1$), the change in investment income is given by $P^N N - \delta P^N R$, again with values both for outward and inward direct investment flows. In steady growth, these values can be expressed as $\rho P^N R^Y$, where ρ is the rate of return to intangible capital. If rates of return are approximately equal for outward and inward stocks, then the final change to net direct investment income (impact on the current account) can be thought of as the rate of return, say 5 percent, times the net of the two stocks.

Finally, for trade in services (1) we need to consider two types of international services transactions: (1a) payments for current services (say, R&D services) performed by one entity on behalf of another located in another country and (1b) transactions values of transfers of knowledge/R&D assets where the latter may be outright sales or, more likely, license payments for a specific period. These two types of services transactions are recorded in separate categories in the services trade data, with the first a component of business, professional, and technical services trade and the second a component of royalties and license fees.

There are three major points to make with regard to these services components. First, the (1b) type of transaction involves previously produced assets (previously performed R&D, say) whereas the (1a) flows mainly represent current production. *In other words, these flows are* $P^N N$*, intangible investment (in part or in whole).* Lest this seem too abstruse, we need to explain that $P^N N$ is itself a sum over types of intangible assets, e.g., software, R&D, marketing,

etc., and the available data on services trade align reasonably closely with many of the assets types suggested in CHS. The flows of R&D services are in fact the series used by Yorgason to obtain his results on the capitalization of international R&D for the BEA satellite account. These flows of R&D services and selected other services relative to U.S. GDP are shown in figure 7. As may be seen, the flows are very much two-way and expanding relative to GDP. But they are still rather tiny relative to GDP—and in relation to intangible investment (recall figure 2) they also are small (intangible investment is estimated to have averaged about 12 percent of GDP from 2001 to 2011). [discuss whether own-account is captured]

Our second main point then is, just as with R&D, capitalization of international investments in intangibles is likely to have very small impacts on international accounts—assuming, that is, that the series shown in figure 7 are not understatements of actual services flows and in fact capture the concepts laid out in our hypothetical MNC data tableau.

How well do services trade transactions pick up the current production of intangibles by U.S. MNCs (or U.S. affiliates of foreign MNCs) on behalf of their affiliates (or headquarters) in foreign countries. Box 3 shows a list of types of transactions covered in the surveys (based on forms posted on BEA's website as of February 19, 2013). The list of services covered seems extensive, even comprehensive given that some services are collected in special-purpose surveys (airline services) or are estimated from administrative sources (educational services provided by U.S. universities to foreign students). Whether the survey data themselves capture the concepts in our tableau, and whether businesses answer with appropriate concepts in mind, we cannot say.

Finally, we (re)turn to the (1b) type of transactions, royalties and license fees. To the extent that international transfers of knowledge occur and are recorded, they fall in this category, as previously discussed. Some observers point to the absolute trajectory of these flows as evidence of the growing importance of IPRs and intangible capital in U.S. trade, and indeed their levels have a very steep trajectory over time (and it is a category with a U.S. trade surplus!). Figure 8 shows the level of U.S. exports of royalties and license fees along with the total for the world. As may be seen, the world total is growing faster than U.S. exports, and the U.S. share has trended down a bit over time. It is difficult to know what to make of this, especially when the same cannot be said for the EU share or the Japanese share (not shown). But one can't help but

Box 3. Types of Transactions Collected in BEA's Benchmark and Quarterly Surveys of Transactions in Selected Services and Intellectual Property with Foreign Persons (BE-120 and BE-125)

Receipts for intellectual property

1. Rights related to industrial processes and products
2. Rights related to books, music, etc.
3. Rights related to trademarks
4. Rights related to performances and events pre-recorded on motion picture film and TV tape (include digital recordings)
5. Rights related to broadcast and recording of live events and performances
6. Rights related to general use software
7. Business format franchising fees
8. Other intellectual property

Receipts for selected services

9. Accounting, auditing, and bookkeeping services
10. Advertising services
11. Auxiliary insurance services
12. Computer and data processing services
13. Construction services
14. Data base and other information services
15. Educational and training services
16. Engineering, architectural, and surveying services
17. Financial services
18. Industrial engineering services
19. Industrial-type maintenance, installation, alteration, and training services
20. Legal services
21. Management, consulting, and public relations services (including expenses allocated by a U.S. parent to its foreign affiliates)
22. Merchanting services
23. Mining services
24. Operational leasing services
25. Trade-related services, other than merchanting services
26. Performing arts, sports, and other live performances, presentations, and events
27. Premiums paid on primary insurance
28. Losses recovered on primary insurance
29. Research and development services
30. Telecommunications services
31. Agricultural services
32. Contract manufacturing services
33. Disbursements to fund production costs of motion pictures
34. Disbursements to fund news-gathering costs and production costs of program material other than news
35. Waste treatment and depollution services
36. Other selected services

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hink the possibility that non-IPR forms of U.S. MNC intangible capital transferred and held abroad are large part of the globalization story.

Summary

The non-rival nature of intangible capital is usually assumed to give rise to inherent accounting difficulties. This is not necessarily the case, however, as argued in some depth in Corrado, Hulten, and Sichel (2009), but the internationalization of intangibles by MNCs brings more of such difficulties to the surface. We made the simple observation, as have others, that the nation is not a natural unit of measurement when it comes to MNCs and intangibles. Apportioning an intangible asset of the MNC to one country vs. another when it is used in both is fraught with difficulty—though not unlike difficulties presented by establishment-based profits accounting whose solutions seem to have found practical acceptance.

We addressed the question of whether international accounts are misstated because globalization has created large and growing uncounted flows of intangible assets. This was done in two steps, the first of which considered current production. Here we made the simple observation that many of the categories of services that are considered intangible investments (and thus current production) are, in principle, captured in BEA's surveys and included in the services trade statistics. Just why these reported services are so small, however, remains to be determined. [own account component]

A second step considered transactions in intangible assets produced in a previous period. We distinguished IPR-protected intangible capital from other forms because payments for IPRs are included in services trade. As a result, U.S. intangible capital deployed in production in a foreign country and associated with a payment will be included. We strongly suspect, both on the basis of previous literature and looking at the international IPR-based data against our own estimates of intangible capital stocks that this is only a small, though growing, part of all that is going on. Nonetheless, the U.S. current account is not seriously misstated for this reason. For this reason and the fact that most intangible assets are not currently capitalized in the national accounts, the U.S. net direct investment position is most assuredly stronger than the currently reported data.

Concluding thoughts

Most analysis, and most data, approach globalization from a national perspective. What gets measured is the flow across borders, into and out of countries or regions (by firms designated as foreign or domestic). This is appropriate given the country-based perspective of national accounts, and the fact that the data are mostly intended to inform national economic and trade policy. But, the logic of globalization is that a new world economic order is emerging (perhaps slowly and painfully) in which companies are less and less inherently national in character. Their production and their revenues (and increasingly their management and product development) are spread all over the world. As a result, the location of profits becomes somewhat arbitrary (our tableau in figure 4 illustrates this). Moreover, the owners of claims against the profits of the firm are spread across the world. Can intangible capital be thought of in national terms?

Because the current CHS classification system and the surrounding rationalization and evidence have had a national perspective, the underlying model is about firms without particular regard to geographical distribution of activities or ownership. The problems that arise are similar to the long-standing problems that arise from the distribution of the firm's activity across establishments within the firm—and also why it is difficult to estimate intangible capital at the industry level (see Corrado and Hulten 2012 for a detailed discussion of this) since much of intangible capital supports the company per se, not its separate establishments (where the production data are collected) and may operate across industries. Of course this is broadly true, but not entirely so: some establishments may need and develop their own intangible capital, particularly since they tend to produce different types of products than other establishments within the firm. This might, for example, include embedded management and marketing structures separate from the headquarters operations—a disaggregation that depends on a firm's business model. In any event this distinction is not pertinent to national macro-level studies that are able to maintain a company focus (although it does suggest a dimension that microdata production studies may need to consider).

The internationalization of intangibles surfaces the same sort company-establishment issue, however, and it seems prudent to introduce certain distinctions as part of any empirical effort to pin down more direct investment positions more precisely. In a globalized firm, consider that

there may be two types of intangible capital: the conventional company-wide type, and country-specific types that are needed to commence or continue operations in a given country (local marketing programs, country-specific product design, local legal systems and labor management procedures, etc.). If this is so, it seems to us that empirical studies of international flows of intangible capital should take this region-specificity into account (some further classification might also be needed to distinguish subsidiaries versus affiliates). In the extreme (and unrealistic) case in which all of a firm's capital is local, then the flow of income is specific to that country-specific capital, not the entire stock summed over countries. This effect is still there in the mixed case when some intangible capital is specific to the whole firm and some to its affiliate country-specific operations. In any case, the relevant stock calculation needs to recognize this point, and we are unaware of anyone who had done this, including McGrattan-Prescott and Bridgman. It may not be possible to distinguish this complexity in data and the calibration approach could be used along with national estimates to pin down first-order impacts.

Finally, we need to emphasize that we did not trace out just how the own-account components of capitalized knowledge service flows work. The U.S. data account for flows between affiliates so in principle some own-account investment is being tracked. Studies have shown that knowledge capital is transmitted between countries (or regions within countries) through the movement of workers, and in addition to a global supply chain of product flows, there is what might be called a global supply chain of talent. In keeping with Marshall's water analogy, human capital flows (and educational services) are a part of globalization and the internationalization of intangibles story, and we hope to address this topic more fully in subsequent work.

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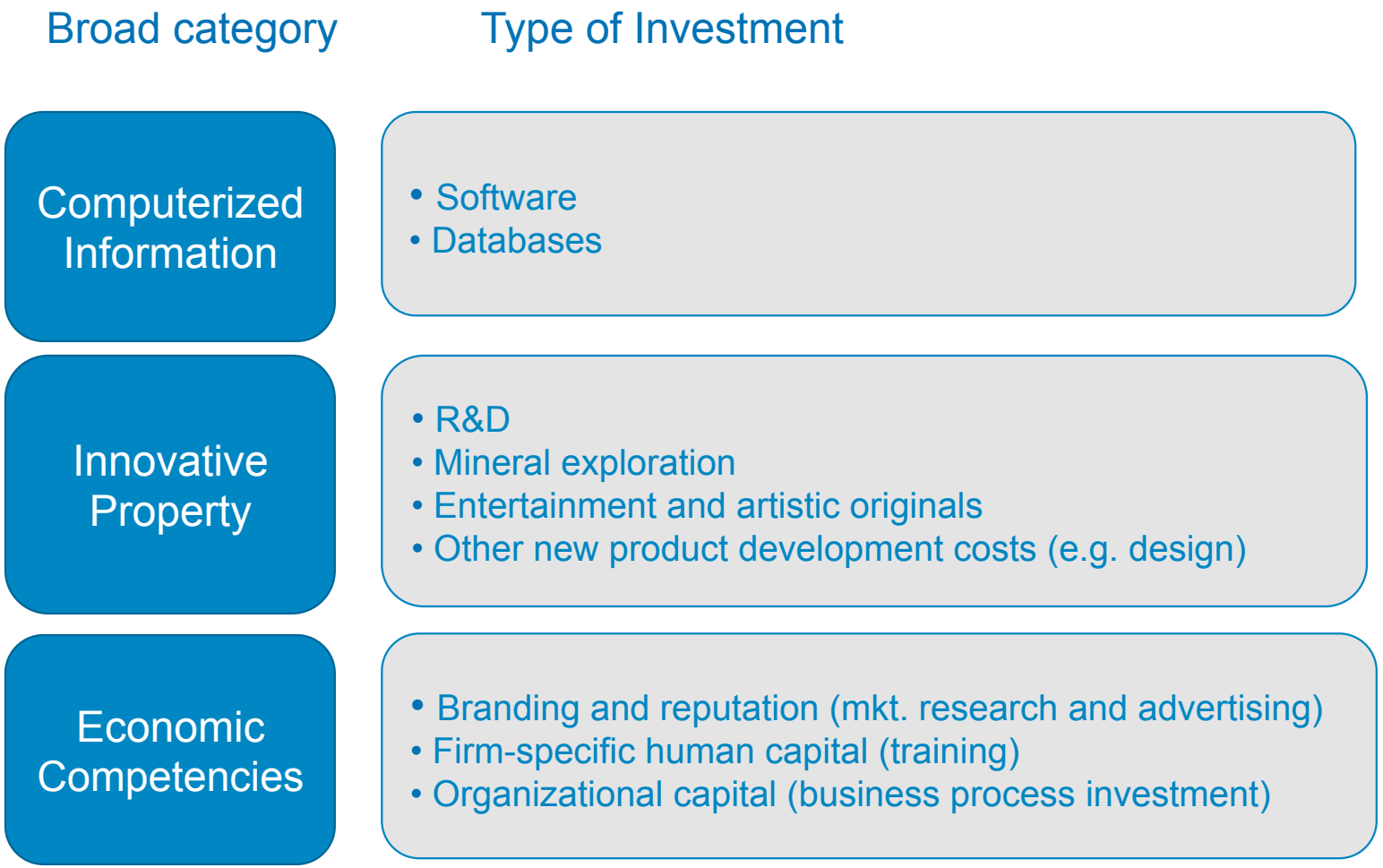
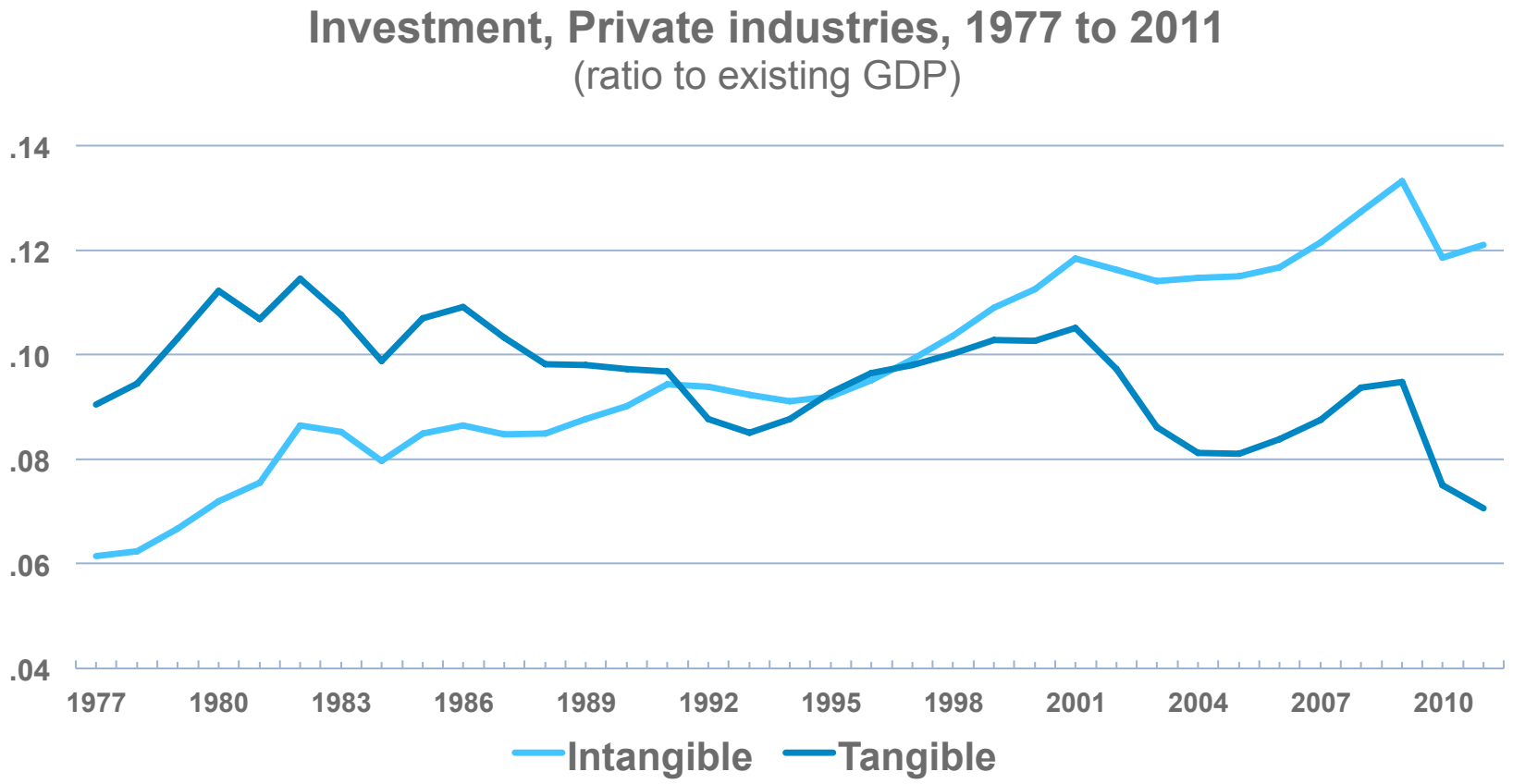
Figure 1. The Corrado, Hulten, and Sichel intangibles framework



Corrado and Hulten, “Internationalization of Intangibles” February 22, 2013.

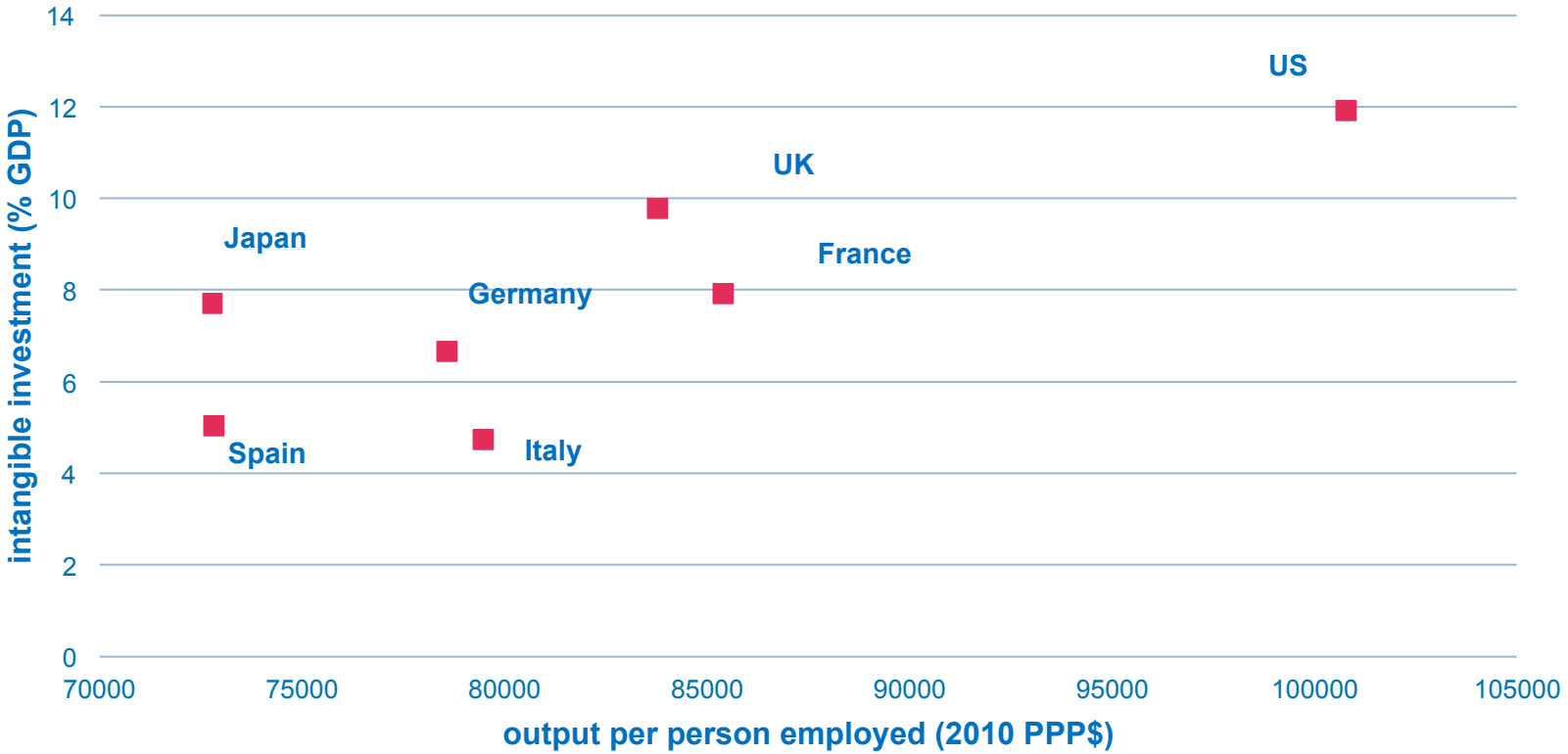
Figure 2. The U.S. intangible and tangible investment rate



Excludes real estate/housing.

Corrado and Hulten, “Internationalization of Intangibles” February 22, 2013.

Figure 3. Propensity to invest in intangible capital in other advanced countries and GDP per worker, 2010



SOURCE—GDP per worker is from The Conference Board's Total Economy Database (2012). Intangible investment estimates are from the INTAN-Invest database (Corrado et al. 2012) and Fukao, Hisa and Miyagawa (2012).

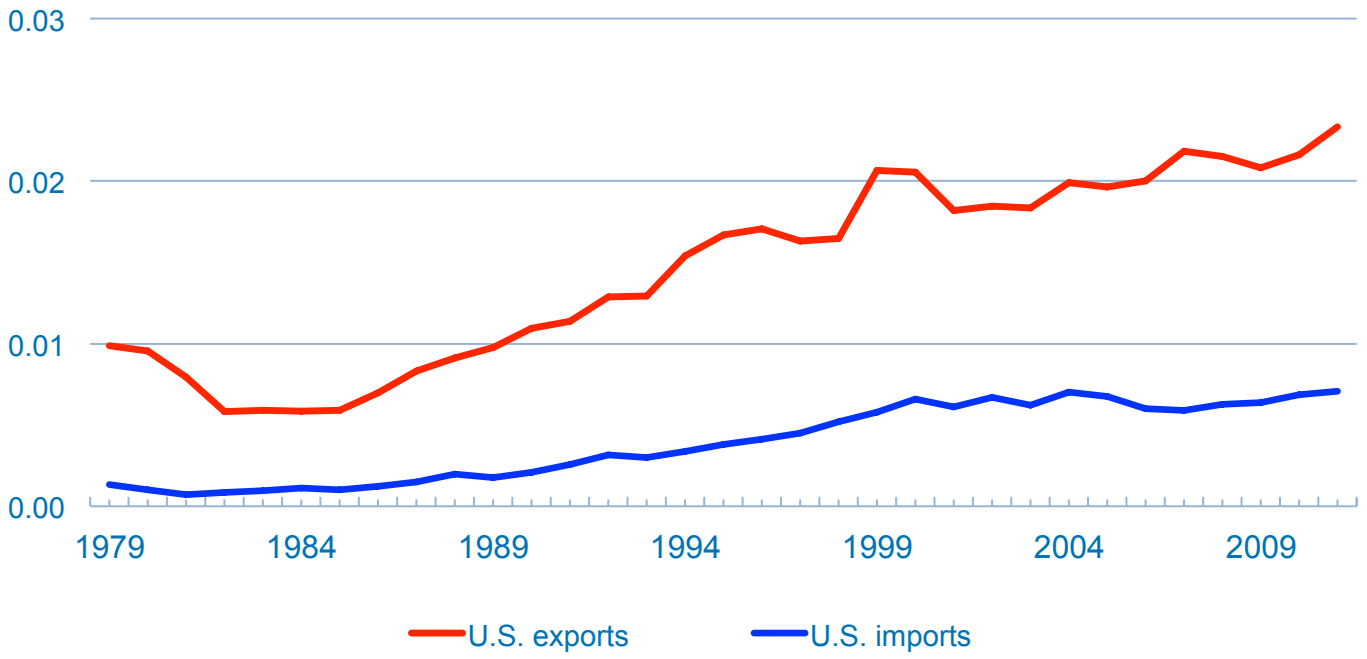
Corrado and Hulten, "Internationalization of Intangibles" February 22, 2013.

Figure 4. Illustrative example: **X** is a firm in country **C** that conducts its R&D in A, makes its product in B, and sells to consumers in C and D.

Item	FIRM X Total	COUNTRY A	B	C	D
1. R&D	20	20			
2. Production cost	100		100		
3. Product imports	n.a.			50	50
4. Marketing/Adv.	30			20	10
5. Management/Adm.	15			10	5
6. **Total Cost**	165	20	100	80	65
7. Sales	215		100	100	115
8. **Surplus**	50	-20	0	20	50
9. Royalty fees	0	70		-20	-50
10. Intangibles/Services	65	20		30	15
11. *of which:* Investment	38	20		12	6
12. Employment	110	10	80	15	5

Corrado and Hulten, "Internationalization of Intangibles" February 22, 2013.

Figure 5. Royalty and license fees relative to intangible capital, 1979 to 2011



Source—Royalty and license fees are BOP receipts (exports) and payments (imports). Intangible capital is from authors' previous work.

Corrado and Hulten, "Internationalization of Intangibles" February 22, 2013.

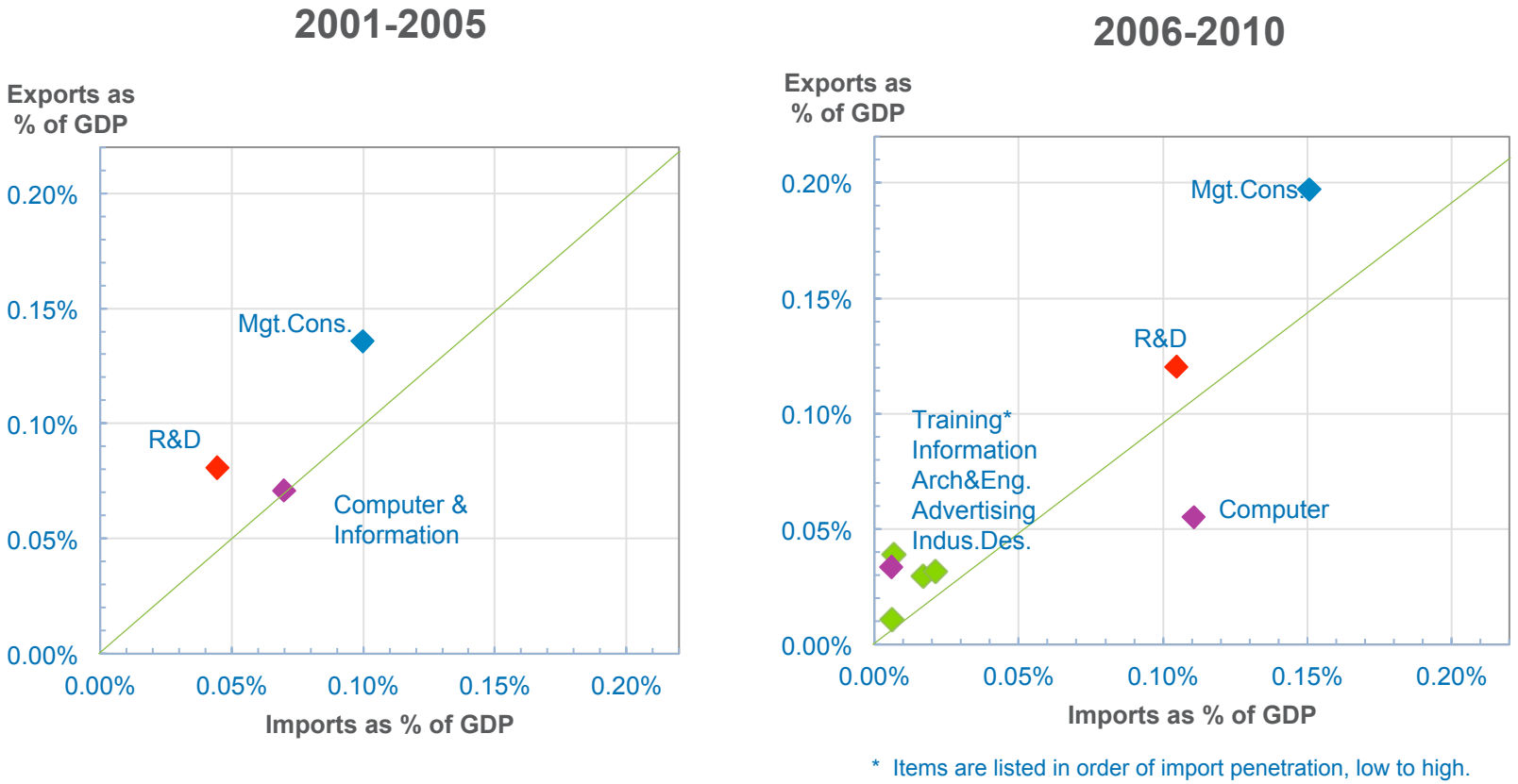
Figure 6. Investment and legal forms

Source—Clayton/Mitra-Kahn (2010) as modified by Corrado (2012).

Type of Investment[1]	Legal Forms					Tacit
	IPR				Other (trade secrets, contracts, etc.)	
	Patents	Copyright	Design IPR	Trade-mark		
Software	X	X	X			
Databases		X			X	
Science R&D	X		X			
E&A originals		X	X			X
Design	X	X	X			X
Market research and communication spending		X		X	X	X
Business process	X	X			X	X
Training						X

1. Mineral exploration is excluded.

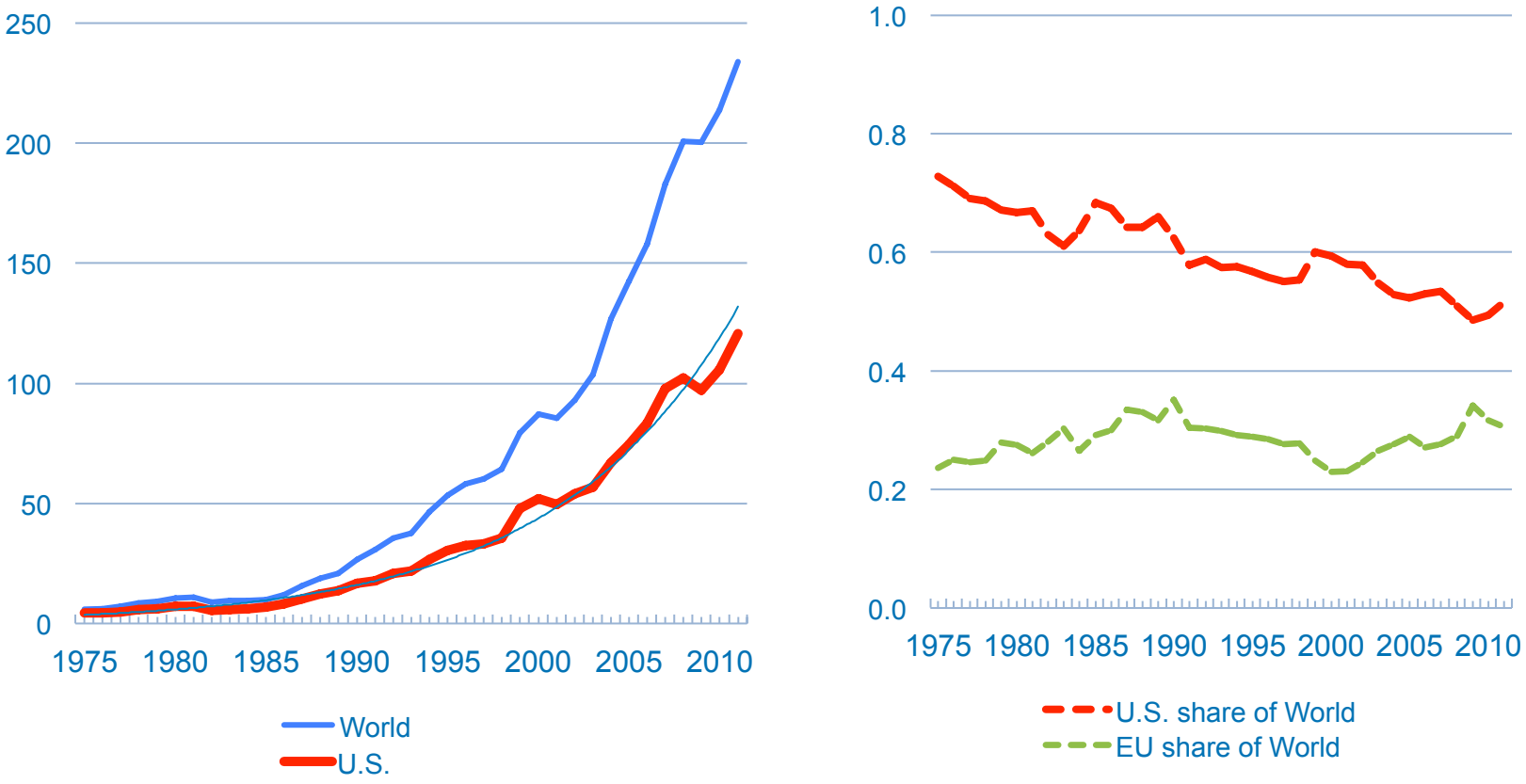
Figure 7. Services trade, selected intangible asset types, 2001-2005 vs. 2006-2010.



* Items are listed in order of import penetration, low to high.

Corrado and Hulten, "Internationalization of Intangibles" February 22, 2013.

Figure 8. Royalty and license fees, 1975 to 2011 (receipts/exports, BOP, billions of dollars)



Corrado and Hulten, “Internationalization of Intangibles” February 22, 2013.