



## **Intellectual Property in the National Accounts**

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## Intellectual Property in the national accounts

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### Summary

The large revision to Irish GDP growth and level estimates have cast doubt on the most quoted economic measure of national accounts. The revision is largely driven by the treatment of payments for the use of Intellectual Property owned by a large Multinational Enterprise (MNE). This paper examines the current international standards on the measurement of Intellectual Property, and the associated payments to enjoy the benefits. The message is that the treatment of Intellectual Property according to SNA 2008 is flawed. It is proposed that an extraordinary early revision to the standards is necessary in order to regain the respect of analysts and users, and prevent a proliferation of “adjusted” measures of GDP.

### Introduction: What is Intellectual Property?

Intellectual Property (IP) is defined as a creation of the mind: an idea, a concept, a design. It is the result of research and creative behaviour. It has the following characteristics.

1. IP is not “produced” in the SNA meaning of the word.
2. IP does not suffer wear and tear; in the same way that natural land does not suffer material degradation. They are both in the same state at the end of a period as at the start.
3. IP is non-rival in nature: it can be shared by more than one client at the same time.
4. “Copying” IP is meaningless: a better description is sharing the original.
5. IP does not provide a new stream of capital services when introduced as an asset in a business – it redefines the production function through technical change. (Solow, 1956), (Romer, 1990), (Jones, 2004)
6. IP is accessed through access devices. (Lynch, 2006). For example, a play is enjoyed through a performance, and the idea of conical suction is enjoyed through the creation of a new kind of Dyson<sup>TM</sup> vacuum cleaner.
7. IP has no specific physical location – only the protective legal instruments such as patents, and the access devices to the IP, can be assigned a location.
8. IP is refined and improved (developed) though the production of prototype access devices, and the idea is accessed through them.

The current international standards for national accounts (SNA 2008 and ESA 2010) do not follow these principles.

The SNA 2008 states that Intellectual Property Products (IPPs) are created through economic production (capital formation), and IPPs are assets treated in the same way as tangible fixed assets created through capital formation. The SNA position is that IP provides services to users, and depreciates in real terms.

SNA2008 paragraph 6.210 says “*Consumption of fixed capital is recorded in respect of the use of the asset in the making of copies the same way as for any other fixed asset used in production.*” SNA2008 paragraph 6.211 says “*The payments made for the licence [to use the original IPP] may be described in various ways, such as fees, commissions or royalties, but however they are described they are treated as payments for services rendered by the owner.*”

This is a key departure from the treatment of IP (non-produced assets) in the international standards before the 1993 SNA.

The extraordinarily large revision to GDP in Ireland is mostly due to the recognition of service payments from abroad for the use of IP protected by the registration of patents in Ireland.. This resulted in a huge new stream of royalties from abroad, with a corresponding consumption of fixed capital in the Irish economy.

It is proposed that the world-wide issue of GDP measures being affected by MNEs minimising global tax returns by inversion of head offices holding patents for IP, into low corporation tax regimes, can be resolved by returning to the original treatment of IP as non-produced entities generating royalty payments (property income) for access to the ideas.

## Section A

In the subsequent analysis, the 2008 SNA model of the creation and use of IPs is taken to be as follows:

- a. The performance of Research and Development (R&D) is gross fixed capital formation of intellectual property products (IPPs).
- b. The result of the R&D is an original asset—the IPP, and copies of this original can be made. The sale or licensed use of copies generates receipts, which are payments for services.

This model leads to inconsistencies in the national accounts treatment of Intellectual Property, with subsequent errors in GDP and associated productivity measures.

In this section, the alternative model, with the characteristics of IP as set out in the introduction, will be discussed in order.

1. It is not “produced” in the SNA meaning of the word

The SNA2008 definition of production is:

*“Economic production may be defined as an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital and goods and services to produce outputs of goods and services.”*

So the definition of the creation of Intellectual Property (an idea) as discovered, invented or “thought up” by a person with no economic inputs, is at odds with the SNA2008 treatment. As no economic production of the idea is involved, then no economic good can be said to be produced and no corresponding fixed capital formation takes place. This is not to say that no asset has been created – an IP asset can be created and patented, as a non-produced asset appearing in the other changes in volume account, and benefits achieved through sharing of the patented IP through a licensing system, with the licence payments recorded as property income.

A major linguistic barrier to accepting the proposal that IP is non-produced is the assumption that Research and Development (R&D) gives rise to IP which is labelled “R&D assets”. As the Development part of R&D meets the SNA definition of economic production activity, the SNA nomenclature implies that the resulting intangible R&D assets must be produced. But the production involved is not directly generating new IP, but rather further developing access devices or prototypes which enable the original idea to be refined.

Following the example used by Sakuma (Sakuma, 2013), consider the creation of the play “Hamlet, Prince of Denmark” by William Shakespeare.

The creation in the mind of Shakespeare of the plot and characters is the original research phase. The first written draft is the first access device (not the first “original” IPP as described in SNA 1993 and SNA 2008). There follows an extended period of Development. Shakespeare reads the first draft and from it creates an improved version of the idea which generates a second draft. This draft is then circulated for comments from interested parties. They will provide comments and opinions, and Shakespeare will take on those which he feels improves further his original intangible concept of the play called “Hamlet”. And so a third draft is produced.

He then finds a producer, who will assemble a director; actors; stagehands etc. and the play will go into rehearsal. The performing of the play in rehearsal will spark new ideas and refinements to the original idea, resulting in a new script and set of stage directions.

Notice that the redrafts, the rehearsal and early preview subsequent performances are all Development: they are production in the SNA meaning of the word. But they are themselves not part of the intangible concept which is the play “Hamlet” in Shakespeare’s mind. This is the idea, the intangible, the Intellectual Property. The development of better access devices to the original idea is a necessary stage in the delivery of the play to the public, but this production is not producing a new concept, it is providing improved access devices which

enable the playwright to consider his earlier idea and refine it in the light of the new access device.

An example from business is Tetrapak<sup>TM</sup>: the invention of a square cardboard bottle with a plastic lined interior, to provide a means of delivering handy containers of drink juice to customers. Moving from the original origami of Tetrapak<sup>TM</sup> to the sophisticated idea behind the production line for cardboard “cartons” was no doubt a long and difficult process, with no guarantee of success. Each slightly better choice of cardboard, of shape, of better plastic lining, would all contribute to a better idea which could be protected through patent.

The principles in both cases of Hamlet and Tetrapak<sup>TM</sup> are the same, and consistent with the treatment of IP before the 1993 SNA.

## 2. Wear and tear

This issue highlights the difference between the models in how the fact that IP does not suffer wear and tear is treated. The absence of wear and tear means that there is no change (no real change) in Intellectual Property over time. Any change in value is a holding gain or loss, occurring due to a change in demand for licences to share in the IP.

There can be no real capital service provided by the IP as there is no real capital consumption, but there can be real capital consumption in the access device. Both IP and access device can suffer loss of value through obsolescence, but obsolescence reflects a change in price payable for access to the IP, and reduced length of life, and not a real decrease in the utility provided.

The 2008 SNA treatment assumes that there is a measurable capital service provided through use of the IP, reflecting the consumption of fixed capital. But this poses the question: If there is no wear and tear, how can there be a reduction in the quantity measure of the IPP, and how can there be a corresponding measure of real capital consumption? Of course, an income stream can have the price basis changed to reflect the general prices of a particular time period, but that is not the same thing as real capital consumption reflecting a real depletion in the quantity measure of a capital asset.

## 3. IP is non-rival

This characteristic allows the IP to be shared, rather than copied.

## 4. The role of IP in a production function

A new idea applied to a business production function will alter the form of the function. For example, the Tetrapak<sup>TM</sup> carton production line will use cardboard instead of glass, plastic lining, folding and shaping machinery instead of glass stamping etc. What the new IP does not do is supply capital services as a contribution to the existing production function. There is no place for glass in the new world of Tetrapak<sup>TM</sup>. So the new idea causes technical change to the production function, replacing glass with cardboard inputs etc.

This is much more in line with the Solow (Solow, 1957) and Romer (Romer, 1990) approaches to introducing new ideas to a production function. Their view is consistent with the IP being an exogenous factor causing technical change to the production function.

5. IP is accessed through access devices. The access devices, even the first of them, are not the original idea, the IP.

A simple example is that IP in terms of a story can only be enjoyed through an access device such as a book, an audio CD or the performance of a reading. Tetrapak<sup>TM</sup> can only be realised through a carton designed according to the Tetrapak<sup>TM</sup> idea. Other examples are pharmaceuticals accessed through drugs and pills, plays through performance, conical suction through Dyson<sup>TM</sup> vacuum cleaners, etc.

7. IP has no physical location

Ideas have no property of location. If the role of IP in multinational production needs to be allocated by location (country) then the access devices to the IP must be specified, and then their location will determine where the benefits of the IP are realised. The location of the legal instruments such as patents which protect the monopolistic power of the IP do have a location, but this only determines where the stream of income from profits made through access devices ends up.

In the Irish case, GDP is generated where the software is employed, but the patent protection only receives licence payments as an income transfer from the access device location to the location of the patent registration.

This identification of IP's contribution to value added through access devices which have a location attribute, suggests a useful approach to the attempts of international organisations such as the OECD to prevent IP patent registration diverting profits to low tax jurisdiction.

For example, if Google ideas are protected through IP patents registered in low-tax jurisdictions, the access devices to these ideas such as computer software, generate profits by location, thus contributing to value added in these locations. The national accounts definition of operating surplus should be adopted as the tax liability measure for corporations, ensuring that income transfers do not enable location shifts of corporation tax due.

8. The role of Development in Research and Development

Development is production, and the labelling of the IP created through R&D as R&D assets has led to the mistaken view that the IP created must be produced. It follows that R&D assets are just like tangible assets in that they will suffer wear and tear as produced assets. But this contradicts the second principle in the introductory part of this paper, that IP does not suffer wear and tear. The apparent difficulty can only be resolved by the concept of access devices, which do suffer wear and tear, and are used in the creation and refinement of the underlying IP – which is an idea with no physical form.

## Section B

What are the practical implications of the difference between the two models?

### Estimates of GDP

- a) Under SNA 2008 and partly under SNA 93, the reclassification of royalties etc. from income transfers to service payments directly affects GDP, when the payments cross national boundaries. Multinationals can arrange their global operations so that IP patents are registered in low profit tax jurisdictions. The associated payments to the country holding the patents can be large and transitory. The upward revision to the annual 2015 GDP growth estimates for Ireland of over 20% has caused negative comments on the probity of the current national accounts. The full article published in *The Economist* is given as an annex to this paper.

Under the alternative model, the payments are shown as royalties (consistent with the earlier SNA standard) and so dramatically affecting the Gross National Income, but not the Gross Domestic Product. There is nothing incredible about such a large change to the GNI, as the new payment streams from abroad are classic “*property income from abroad*” measures. In a perfect world, this income would not be held for a long time as a cash mountain, but re-distributed to the ultimate beneficial owners. So the net effect on GNI would be small in the long run. There may well however be temporary large rises and falls in cash holdings in the recipient country. It is also possible that dividends etc. may be distributed through the guise of loans at very advantageous terms, again distorting the measures of GNI.

The widely spread criticism of the revision to the Irish GDP and the fragmentary response necessary given the current international standards for IP in the national accounts, is symptomatic of the increasing vulnerability of national accounts to be downgraded as reliable official statistics. (Lynch and Thage, 2017).

### Productivity analysis

- a) Under the SNA2008 treatment, the benefits from IP are treated as providing a real flow of capital services as an endogenous input to the production function. Under the alternative model proposed in this paper, IP is assumed to be an exogenous factor, changing the make-up of a production function through technical change.
- b) The OECD and the productivity school reflecting the approach led by Dale Jorgenson (Jorgenson and Schreyer, 2013) have welcomed the recognition of capital services as part of the SNA accounting framework. In particular they have accepted that IP (the outcome of R&D as intangible assets) provides nominal and real capital services to the production function. The possibility that IP causes technical change rather than a stream of ongoing capital services is not considered in their paper.

## Section C

The following example demonstrates the role of IP as altering the form of a production function through technical change, rather than contributing capital services as tangible capital assets do.

Consider a cook with a recipe for tomato soup, with ingredients of tomatoes, water, salt and sugar. A stove, and large pot are capital assets used to cook the soup. It is distributed by ladle through a street stall.

The cook explores how to improve the soup, and tries various possibilities such as adding basil, and chillies. This is successful with the customers, and the new recipe (the IP) is adopted and the new tomato soup is sold as “spicy tomato soup”.

The change to the production function is not the addition of capital services from the new recipe (how can the idea suffer real change?), but rather a change to the form of the production function, through recognising changes in the pattern of ingredients to make the soup.

The essential differences following from the exogenous approach, compared to the endogenous OECD/Jorgenson approach adopted for the SNA, are shown in Table 1.

Table 1. The Different Effects of the SNA 2008 Model and the Alternative Model for the Performance of R&D Creating Intellectual Property (after Lynch and Thage 2018)

Concept / measure	SNA 2008	Alternative
Intellectual Property	produced	Non-produced
Research	Capital formation	Intangible asset creation
Development	Capital formation of IP	Capital formation of access device enabling refinement of original IP
Payments for use/access	Payments for services	Property income transfers
Change in value of IP over time	Nominal due to price change and real due to ?	Holding gains and losses only, no change in state
Role of IP in productivity	Endogenous provision of capital services	Technical change, requiring changes to historic production function structure

## Section D

### The measurement challenges.

Valuation of Intellectual Property where it is not made available on the market through licensing or outright sale is extremely difficult. Most IP is created and used in multinationals, without ever being sold on the market. The only time an observable value of such IP is usually when a company is subject to a take-over bid, and the associated goodwill component of the value of the company is revealed.

Can statistical offices, as compilers of national accounts, carry out surveys on IP assets in the economy, obtaining estimates of the value of the IP by company? A significant barrier is that

under Financial Reporting Standards (FRS), the relevant standard (IAS 38) requires companies to score all research and most development at cost in the company accounts.

A first estimate of the value of the IP may be made as the sum of costs for all the research and development, clinical trials, marketing, etc. undertaken to bring a new drug to the market, and including the costs of unsuccessful R&D in a project with the same general objective. This initial estimate can be revised as market performance and the observed monetary returns become available, giving a firmer basis for estimating asset value as the sum of future discounted economic benefits.

But these valuation methods presume that specific research projects can be distinguished, where the costs and profitability of each one will eventually be known. Probably the closest to statistical observations would be variations in the market value of the medical firm caused by expectations on the performance of the new medicine, but again the market value will be influenced by other factors making allocation of the values to a specific medicine extremely difficult.

It follows that there are no easy ways to obtain a reliable market valuation of IP. The value of the IP is the net present value, determined by expected future receipts for access to the IP. In theory this value would be reflected in the market price for a similar asset (SNA, 2008 6.251). But the unique nature of IP (if it is not unique, then it must be the same as existing IP, and so of no extra value) means that unlike produced tangible capital assets, there can be no similar IP assets at comparable basic prices.

According to 2008 SNA 10.99 *“the knowledge remains an asset as long as its use can create some form of monopoly profit for its owner. When it is no longer protected or becomes outdated by later developments, it ceases to be an asset”*. As IP assets have no material existence there is no wear and tear, and no accidental damage, and therefore their service life is wholly determined by their becoming obsolescent – i.e. when the price for access to the IP becomes zero. IP can increase in value over certain periods of their life time, as the idea “catches on”, rather than just showing a continuous decline. But as noted above, the lack of identifiable units and specific prices reduces these valuation principles to an academic exercise.

Given the essential role that IP plays in driving economic growth, estimates of the value of IP are badly needed. One approach is to require companies to keep records of licence revenues generated by individual IP assets recognised in the capital account, and use the information to seed a model of the sum of future discounted revenues to give a more accurate estimate of the asset values. Such exercises are not part of the FRS standard, but are surely part of business management to determine the future strategies of a company.

Annex: The Irish experience

An article in “The Economist, European print edition, July 2016

## Not the full shilling

*Why GDP growth of 26% a year is mad*

THE year 2015 was a busy one in Ireland, what with protests against water charges, a referendum legalising same-sex marriage and speculation over a coming general election. No wonder the Irish failed to notice their country’s record-breaking economic growth. On July 12th, in front of gobsmacked journalists, Ireland’s Central Statistics Office (CSO) revised up GDP growth for 2015 from 7.8% to 26.3%. In modern economic history, only poor countries experiencing natural-resource booms or the end of wars have grown faster.

Few economists take the revised figure seriously. “It’s complete bullshit,” says Colm McCarthy, an economist at University College Dublin. “It’s Alice in Wonderland economics.” But while the 26.3% figure may distort economic reality, it has real political consequences.

The CSO calculations are not flawed, Mr McCarthy says. The change stems from a Europe-wide shift in the way investment is treated in GDP statistics. When a company executes a “tax inversion”, registering in Ireland to benefit from its low 12.5% corporate tax rate, it and its intellectual property are now added to the country’s capital stock, and the returns are included in GDP. Ireland’s capital stock grew by one-third in 2015, as American firms rushed to pull off tax inversions in anticipation of a likely crackdown. Ireland’s booming air-leasing sector also inflates the figures: planes owned by local firms are included even though most never visit the country.

Spectacular growth sounds good. It will make it easy for Ireland to satisfy the euro zone’s demand that countries keep their budget deficits below 3% of GDP. But this may allow politicians to return to bad habits. The finance minister promises not to indulge in tax cuts or spending increases, but his minority government may ditch that pledge to win friends in parliament. Ireland will be the country hit hardest by Brexit. It should be building up fiscal firepower, not spending it.

A second risk is that the Irish will lose all trust in economic figures. Voters are already alienated because most growth is concentrated in Dublin and does not reach the countryside. Fairy-tale GDP statistics will worsen their scepticism. One can hardly expect voters to embrace sound economics when the statisticians seem to be living in virtual reality.

## Gross domestic blarney

Ireland's GDP, % change on a year earlier



Source: Central Statistics Office of Ireland

Economist.com

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