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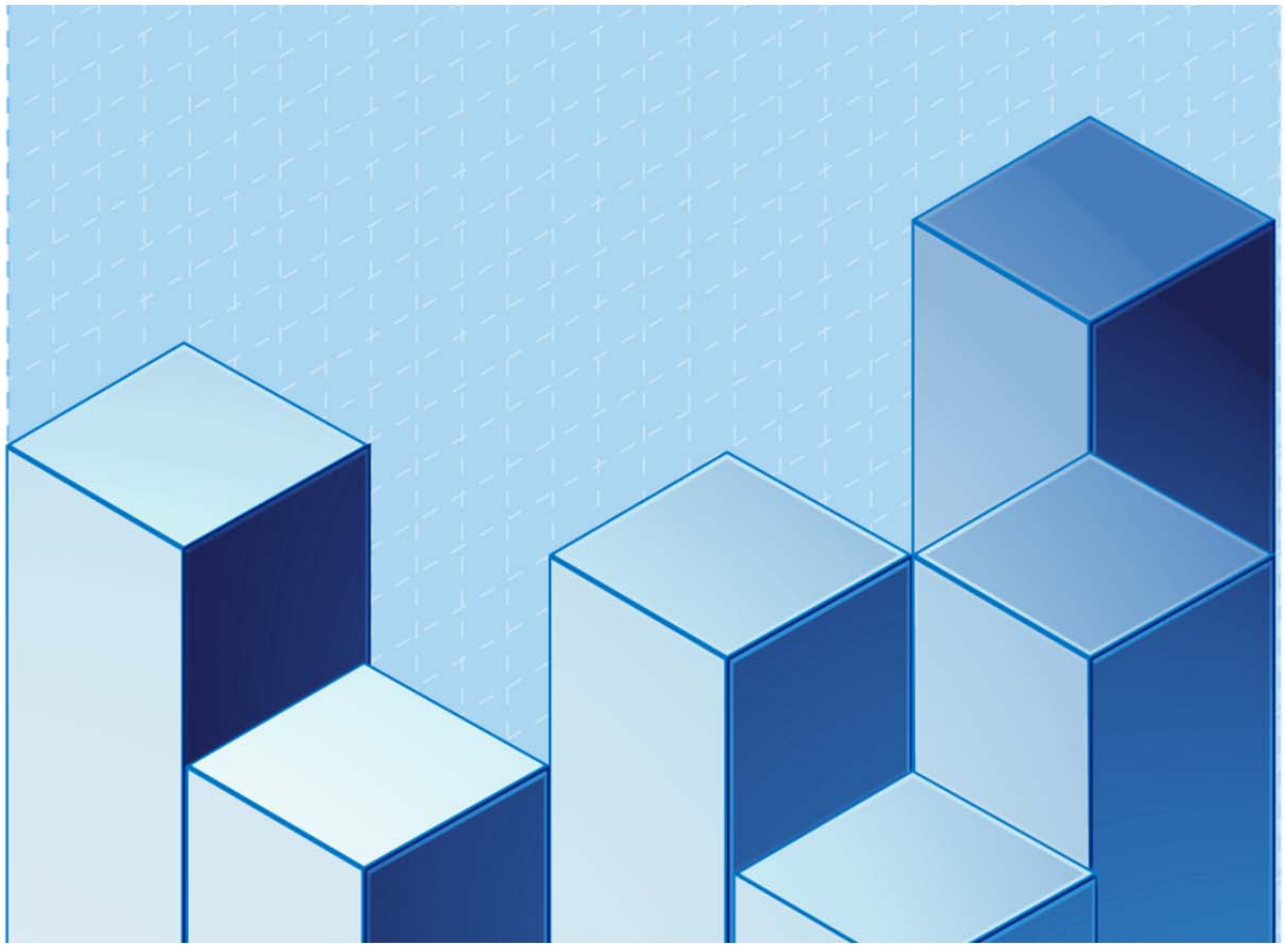

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Fabio Bacchini
Roberto Iannaccone*

Abstract

Usually last data for intangible assets are available when data for use table are released that is, at least for European statistical system, more than 2 years from the reference period. However policy makers need updated pictures for a fine tuning of their political proposal.

To fill this gap, this paper proposes a methodology for real time estimation that take explicitly into account the heterogeneity of the intangible assets. Particularly for the assets related to the use table we present a three step procedure that uses all the most recent information available from national account and in Short-Term Statistics domain. The procedure has been applied using as case study Italian economy obtaining a provisional picture of the nominal investment in intangible that can be more timely.

Keywords: Real time estimation, intangible capital.

* F. Bacchini: Istat; R. Iannaccone: Istat and LUISS Lab.

Real time estimation for policy analysis

By Fabio Bacchini and Roberto Iannaccone

I. Introduction

TO provide policymakers with dnamic tools to better address Europena policies it is fundamental to produce real-time estimates of public intangible investment. However complete national accounts picture are usual related to the structural business statistics data that are available approximately 2 years after the reference period.

The underlying data sources for the scope of the SPINTAN project are equally not available with a sufficient timely manner. In such way the time coverage

of SPINTAN database can not be updated to the current period (for example 2015). Thus, the SPINTAN estimates on public intangible investment and capital services for 22 European countries, and the United States had to be limited for the period 1995-2012.

In order to be able to get a real time perspective on the role of public intangibles, it is important to develop and implement a now-casting method that complements the historical data in a satisfactory way.

From a general point of view we are in the same framework of quarterly national accounters that make a preliminary estimation of the annual national account using the so called short-term statistics information.

Using a similar approach, this paper proposes an alternative method to enhance, for the first time, the timeliness of public intangibles and thus the analytical relevance of public intangible investment for policy decisions. We propose to compute the real time estimation by means of a three step procedure based on quarterly turnover for service sector and national accounts aggregates for industry, both available for the last year. In the first step we compute a preliminary estimation of the use table conditioned to the known growth rate for industry and institutional sector. In the second stage we elaborate a new estimate for the use table conditioned to the growth rate of the products observed in the quarterly turnover for industry. The final estimate is the average of the two independent estimates elaborate in each step.

Section 2 introduces the characteristics of the information set that we use for real time while section 3 provides an outline of the methodology with a simulation for Italy on 2011. Section 4 presents the comparison of the real time estimation for Italy .

II. Real time framework

The provision of a preliminary picture of the most important economic indicators is a quite common challenge in the domain of short-term statistics (see for

example Schumacher et al. 2008 and Bacchini et al. 2010 referring to GDP). Eurostat and UNSD are currently working on an Glossary and Handbook on Rapid Estimates (Mazzi 2014), as part of a common project to improve quality and standardisation of infra-annual macro-economic statistics. The glossary reports 4 main dimensions able to characterize a real time estimate:

1) **Who** makes the evaluation

2) **What** is evaluated

3) **How** is the evaluation done

4) **When** is the evaluation done

The first dimension refers to the producer of the real time. There are different subjects from statistical agency (i.e. Eurostat first release of GDP, Eurostat 2015 to private institution o researchers (see for example the project at https://www.now-casting.com/). Clearly producer of rapid estimates may or may not be the same as the producer of regular releases of a given indicator. Looking at the public intangible database, the Spintan Consortium is in charge both for the estimate of definitive data, time series from 1995-2012 obtained by means of a backcasting methodology (see Bacchini et al. 2015), and for the real time picture.

The second and the third dimension are closely related to the characteristics of the intangible assets that are mainly non estimated by statistical agency (Software and research and developments represents an exception after the introduction of SNA 2010). This issue represents a big challenge for the Spintan Consortium introducing for the first time in the intangible domain the real time estimation. In the next years the preliminary pictures released by the proposed real time framework will be required to be confirmed by new estimates allowing for a first evaluation of the errors due to real time methodology. Along this approach the methodology proposed follows the regular production process for the intangible assets.

The last dimension (**When**) refers to the the information set available at a certain point to estimate the target variable. The target for intangible assets is to provide preliminary estimation up to t-1 (i.e. in 2016 will provide an estimation up to 2015). This goal will be relevant compared to the timeliness available for the other intangible database (see for example http://www.intan-invest.net/).

It is important to stress that our aim is to produce a preliminary estimation of the assets Organizational capital, Training, Advertising and Design (hereafter, OTAD assets) while a real time picture for Software and R&D is already available from the quarterly national accounts (1, the grey area represents the space for real time estimates).

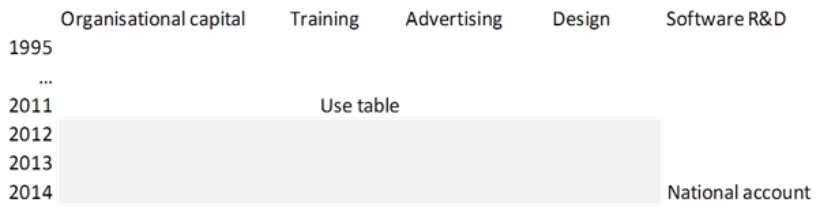

Figure 1. Use Table availability

According to the theoretical framework developed in Corrado et al. (2012), the information set required to produce an estimation for OTAD assets is represented by the use table, that are released by National Institute of Statistics with a delay of two years from the reference year. In such way, for example, at the end of 2014 use table is available up to 2012. Supposing to have data available for the use table, in the proposed estimation method the nominal values of intangible assets can be approximated by the growth rates of total intermediate expenditure by industry (M72, O84, P85, Q86, Q87-88, R90-92) for the OTAD assets as shown in Figure 2.

To explain the information set at the glance we use as case study data availability for Italy. For example, the whole information set in 2012 includes intermediate

Growth Rate between year t and year t-1						
	M72	O84	P85	Q86	Q87-Q88	R90-R92
Organisational Capital						
Advertising						
Design						
Training						
Total						

FIGURE 2. INFORMATION SET FOR OTAD PRODUCTS AND INDUSTRIES

expenditures cross-classified by industry and assets for the total economy (last row in Figure 3). The estimation methodology currently used in the Spintan project provides data split for the non market sector (S13-S15).

	M72	O84	P85	Q86	Q87-Q88	R90-R92		Total S13 -M72-R92
Organisational capital	44	1,383	719	805	517	118	...	3,586
Design	66	264	436	872	235	33	...	1,906
Advertising	3	65	93	82	25	65	...	333
Training	5	918	360	185	142	25	...	1,634
	...	...	...	...	...	...	...	
Total S1	4,434	31,516	10,720	47,378	10,844	15,457		

FIGURE 3. INFORMATION SET FOR OTAD PRODUCTS AND INDUSTRIES: ITALY

To provide a preliminary estimation for the use table we need to explore the information available for the years 2013-2015 that could be used as a proxy for the dynamic intermediate expenditures of products and industries. A first source is given by National Account aggregates as intermediate consumption by industry. As shown in Figure 4 data for Italy are available up to year 2015 at current prices but for the total economy. This represents the maximum detailed breakdowns on production, consumption, investment and income given by annual national accounts.

Another important information source is given by the annual accounts by institutional sectors. The sector accounts show detailed economic developments by

NACE_R2	NACE_R2(L)TIME	2010	2011	2012	2013	2014
TOTAL	Total - All NACE activities	1,673,556.4	1,743,101.3	1,683,002.1	1,639,348.8	1,618,436.0
M72	Scientific research and development	4,421.1	4,433.9	4,932.6	4,622.6	4,809.6
O	Public administration and defence; compulsory social security	33,449.2	31,516.4	30,263.8	30,419.4	29,627.4
P	Education	10,782.6	10,720.0	10,978.0	10,928.5	11,296.1
Q86	Human health activities	45,906.4	47,377.5	47,606.9	47,332.4	48,608.9
Q87_Q88	Residential care activities and social work activities without accommoda	10,982.4	10,844.1	10,903.6	10,828.5	11,183.2
R90-R92	Creative, arts and entertainment activities; libraries, archives, museums	14,541.9	15,457.1	16,148.4	16,462.2	

Figure 4. Intermediate consumption for industries - Italy

institutional sectors and are only calculated at current prices (in nominal terms). From the sector accounts we have information also on the composition of intermediate consumption for institutional sectors up to 2015.

date of transmission of non-financial accounts: 01/10/2014

Uses							Current accounts	
Households including NPISH (S.14+S.15)	General government (S.13)	Financial corporations (S.12)	Non-financial corporations (S.11)	Total economy (S.1)	Rest of the World (S.2) Extra-EA	Sum over sectors (S.1+S.2)		
							PRODUCTION ACCOUNT	
							P.1	Output
132,403	87,251	55,291	1,375,739	1,650,684			P.2	Intermediate consumption
454,179	218,781	70,505	713,338	1,456,803			B.1g	Gross value added
							D.21-D.31	Taxes less subsidies on products
				1,618,904			B.1g* (1)	Gross Domestic Product (GDP)

Figure 5. Total production for institutional sector - Italy

At the same time the assets dynamic (products) can be approximated by the quarterly turnover for the service sector except for training for which we use hours worked from National Accounts in training industry (P) available up to 2015.

III. Methodology

In this section we will describe the methodology for real estimation using the information set available. In particular the results are obtained by a procedure organized in three steps.

In the first step we compute a preliminary estimation of the use table conditioned to the known growth rate for industry and institutional sector. In the

second stage we elaborate a new estimate for the use table conditioned to the growth rate of the products observed in the quarterly turnover for service sector. The final estimate is the average of the two independent estimates elaborate in each step.

To illustrate the procedure we suppose that last data released for the use table are for year 2010 for the S13-S15 sectors and we would like to produce a real estimate for 2011. In this way it is possible to produce a pseudo real time evaluation of the performance of the method. We use Italian data as reported in figure 3.

Supposing that the last data available for the use table refers to 2010, by means of the intermediate consumption available for 2011 (see figure 4) we update the total intermediate consumption for industry. Because these values are referred to the total economy we need a proxy for the intermediate consumption dynamic for non-market sector. For 2011 is available also the information about the total production and intermediate consumption for institutional sectors (see figure 5). In such way we can calculate the growth rate for the share of intermediate consumption in non market sector in the whole economy. This information can be combined to estimate the total of intermediate consumption in non market sector in 2011 for industries. The intermediate consumption for all the Spintan assets is then calculated considering the distribution observed in 2010 (see figure 6).

2011 -Italy S13-S15 estimated Industry

	M72	O84	P85	Q86	Q87-Q88	R90-R92		Total S13 -M72-R92
Organisational capital	39	1,494	728	831	530	127	...	3,749
Design	59	209	416	882	224	32	...	1,823
Advertising	3	62	88	82	23	61	...	319
Training	4	829	343	183	134	25	...	1,518
	...	...	...	...	...	...	...	
Total S13-15	106	2,593	1,574	1,978	912	245	7,409	
Total S1	4,434	31,516	10,720	47,378	10,844	15,457	120,349	
	2.4	8.2	14.7	4.2	8.4	1.6	**-4.2**	

FIGURE 6. REAL TIME ESTIMATION PROCEDURE: STEP 1

At the same time it is feasible to derive an estimation of the use table for 2011

for the Spintan assets. Considering data from the quarterly index of turnover for services we can calculate the growth rates for 2011. These are then applied to the intermediate consumption by products in 2010. In such way we obtain in this second step the estimation of the total by product and the intermediate consumption for all the Spintan industries is then calculated considering the distribution observed in 2010 (see figure 7).

2011 -Italy S13-S15 estimated STS+NA

	M72	O84	P85	Q86	Q87-Q88	R90-R92		Total S13 -M72-R92
Organisational capital	41	1,647	761	836	558	124	...	3,968
Design	59	224	422	863	229	30	...	1,828
Advertising	3	67	90	81	24	59	...	325
Training	5	906	355	183	140	24	...	1,613
	...	...	...	...	...	...	...	
Total S13-15	108	2845	1629	1963	951	238		7,734

FIGURE 7. REAL TIME ESTIMATION PROCEDURE: STEP 2

Finally, in the third step we obtain our real time estimation for 2011 as an average of the single cell elaborated in the first and in the second step (see figure 8)

2011 -Italy S13-S15 Final average

	M72	O84	P85	Q86	Q87-Q88	R90-R92		Total S13 -M72-R92
Organisational capital	40	1,570	745	833	544	126	...	3,858
Design	59	217	419	872	227	31	...	1,825
Advertising	3	64	89	82	24	60	...	322
Training	4	868	349	183	137	25	...	1,566
Total S13-15	107	2,719	1,602	1,971	932	242	...	7,571

FIGURE 8. REAL TIME ESTIMATION PROCEDURE: STEP 3

The pseudo real time estimates for 2011 are compared with the true value. Overall the proposal method reports an error of 1.5% that implies a significant non optimal estimation for the organisational capital in the public administration (13.5%).

2011 -Italy S13-S15 error

	M72	O84	P85	Q86	Q87-Q88	R90-R92		Total S13 -M72-R92
Organisational capital		13.5					...	7.6
Design							...	-4.2
Advertising							...	-3.5
Training							...	-4.2
Total S13-15	-9.6	3.4	-0.4	1.3	1.5	0.6	...	**1.5**

FIGURE 9. REAL TIME ESTIMATION PROCEDURE: ERRORS

IV. Results

The procedure presented in the previous paragraph has been applied to derive an estimation for the Italian OTAD assets updated to 2014 (see figure 10). The aggregate picture for Italy describes a decreasing in the OTAD asset in 2012 (-1.9%) a table evolution in 2013 and an increasing in 2014 ($+2.1\%$). This pattern is driven by the evolution of the organisational capital in 2012-2013 while in 2014 is recorded an increase for all assets.

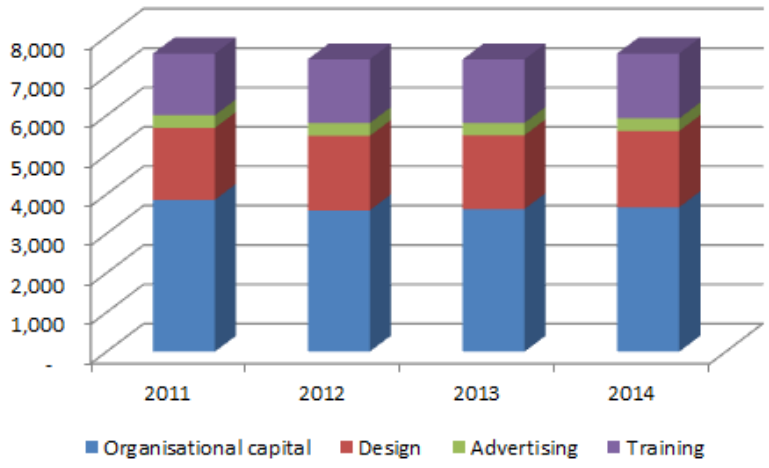

FIGURE 10. INVESTMENTS IN INTANGIBLE ASSETS: ITALY 2011-14

The evolution OF OTAD assets for Italy is similar to that one observed for USA

excepted the behaviour of organisational capital in 2013 that showed a significant contraction in USA while a stable patter for Italy.

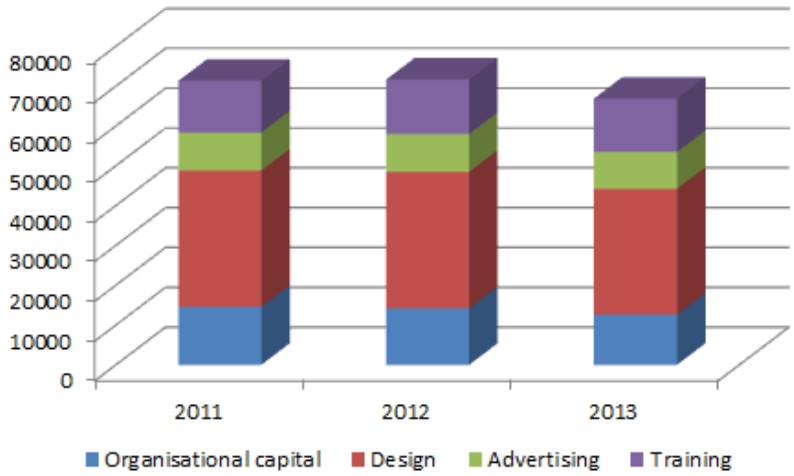

FIGURE 11. INVESTMENTS IN INTANGIBLE ASSETS: USA 2011-13

This exercise has been repeated for all European countries to have a complete dataset for the estimation of investments in intangible assets up to 2015.

V. Summary and discussion

The method presented in the previous pages has been applied to the European countries and an unpdated database with data until 2015 is now available.

A different procedure has been derived to produce real time estimates for software and R&D.

We think that the realtime database will be an important instrument to enhance the discussion about the impact of intangible assets on economic growth.

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