Direction des Études et Synthèses Économiques

G 2014 / 12

Computing additive contributions to growth and other issues for chain-linked quarterly aggregates

Franck ARNAUD, Jocelyn BOUSSARD
Aurélien POISSONNIER et Hélène SOUAL

Document de travail

Institut National de la Statistique et des Études Économiques

INSTITUT NATIONAL DE LA STATISTIQUE ET DES ÉTUDES ÉCONOMIQUES

Série des documents de travail
de la Direction des Études et Synthèses Économiques

G 2014 / 12

Computing additive contributions to growth and other issues for chain-linked quarterly aggregates

Franck **ARNAUD***, Jocelyn **BOUSSARD***
Aurélien **POISSONNIER**** **et** Hélène **SOUAL***

NOVEMBRE 2014

Ce travail a été réalisé afin de contribuer à la discussion de la réédition du manuel du FMI sur les comptes trimestriels. Il a servi de base à la contribution des auteurs à un groupe de travail organisé par le FMI à Vienne en novembre 2014. Les auteurs remercient leurs collègues des comptes nationaux de l'Insee qui depuis 2007 ont contribué à l'accumulation des connaissances résumées ici et à leur mise en œuvre au quotidien.

---

* Département des Comptes Nationaux - Division des Comptes Trimestriels Timbre G430 - 15, bd Gabriel Péri - BP 100 - 92244 MALAKOFF CEDEX

** Département des Études Économiques - Division Études Macroéconomiques Timbre G220 - 15, bd Gabriel Péri - BP 100 - 92244 MALAKOFF CEDEX
Crest-LMA & École Polytechnique

Département des Études Économiques - Timbre G201 - 15, bd Gabriel Péri - BP 100 - 92244 MALAKOFF CEDEX - France - Tél. : 33 (1) 41 17 60 68 - Fax : 33 (1) 41 17 60 45 - CEDEX - E-mail : d3e-dg@insee.fr - Site Web Insee : http://www.insee.fr

Computing additive contributions and other issues for chain-linked quarterly aggregates

Abstract

Since 2007, the French Quarterly National Accounts use a chain-linking method to measure volumes in replacement of volumes in constant prices of the reference year. This paper gathers 7 years of experience of the Quarterly National Accounts unit on this particular topic.

We first recall the annual overlap method used in France in comparison with the one quarter overlap method sometimes preferred in other countries. Based on numerical simulations, we show the distribution of two well-known effects: trend effects when elemental prices have different dynamics and non-additivity. In particular, the variance of these effects increases away from the reference year.

We also expose two new reasons to prefer the annual overlap method to the one quarter overlap: first, additive contributions to growth can be computed; second, unpleasant interactions with seasonal and trading day adjustment can be avoided.

Keywords: chain-linking, annual overlap, one quarter overlap, contribution to growth, seasonal and trading day adjustment

---

Calcul de contributions additives et autres difficultés des comptes trimestriels en volumes chainés

Résumé

Depuis 2007, les comptes trimestriels français utilisent des volumes chainés en remplacement des volumes à prix constants de l'année de base. Ce document compile 7 années d'expérience de la division des comptes trimestriels sur ce sujet.

Nous présentons la méthode de recouvrement annuel utilisée en France en la comparant à la méthode de recouvrement trimestriel parfois préférée dans d'autres pays. Sur la base de simulations numériques, nous illustrons deux propriétés des volumes chainés : l'effet tendanciel lorsque les prix des composants d'un agrégat ont des dynamiques divergentes et la non-additivité. Notamment nous montrons que la variance de ces effets croît lorsqu'on s'écarte de l'année de base.

Nous détaillons également deux nouvelles raisons de préférer la méthode de recouvrement annuel au recouvrement trimestriel : tout d'abord il est possible de calculer précisément la contribution d'un composant à la croissance d'un agrégat ; ensuite des interactions indésirables avec la correction des variations saisonnières et des jours ouvrés peuvent être évitées.

Mots-clés : volumes chainés, annual overlap, one quarter overlap, contribution à la croissance, correction saisonnière et des jours ouvrés

Classification JEL : C43, C82, E01

1 Introduction

One of the major objectives of the national accounts is to describe the changes in the major economic aggregates, in particular after cancelling out the effects of price variation, to analyse in volumes the growth of domestic output, consumption, etc. These volumes give a clearer idea of quantity exchanged or produced. However, simply adding up the quantities of elementary components involved is irrelevant: the quantity of cars is not directly comparable with the quantity of bicycles. These quantities need to be made commensurate. Calculating the volume of an aggregate requires to weight the volumes of its components through prices. The choice of a reference period, which will determine this structure of the prices, is thus of crucial importance.

There are two available options:

- calculating volumes using constant prices derived from the reference year;
- calculating volumes of each year using the prices observed in the previous year and then chain-linking. The idea behind these chained-linked volumes is to cumulate the growth rates in volumes starting from the values established for a given reference year. Doing so the evolutions of volumes at previous year's prices are preserved, and the chain-linked volume accounts form time series without breaks in the structure of prices every year.

The relative weight of each component in an aggregate in volume depends on the prices of a particular *weight period*. These prices can be markedly modified with time. Estimating chained volumes based on previous year's prices thus offers the dual advantage of providing data suitable for constructing time series and also accounting for any change in the relative price structure: simply put, they provide a more satisfactory description of the economic reality when the prices of some products evolve very differently than others.

However, these chained volumes do pose specific problems. They can prove misleading when prices tend to oscillate rather than evolve following a coherent trend. This may be the case, for example, with agricultural and energy prices [Berthier, 2002]. Furthermore, these volumes lose their additivity with regard to volumes calculated more simply at constant prices of the reference year.

Faced with these complex problems, until 2007, the French quarterly accounts used volumes calculated at constant prices of the reference year. In France, the difference between chain-linked volumes and the volumes obtained by using constant prices of the reference year was relatively minor.

However, European harmonisation, and the increasing disparity observed between the chained volumes and volumes in reference year prices for some product-operation pairs, led to a methodological change: since 2007 the French quarterly accounts are published in chain-linked volumes at the previous year's prices, using the annual overlap method.

With the one quarter overlap method, the annual overlap method is one of the most widespread technique to chain-link the QNA (see Table 2 in appendix). For both techniques we recall the algebra (section 2). The formulae theoretically show that QNA in annual overlap exactly coincide with the corresponding annual accounts but there is a residual price effect every first quarter. With the one quarter overlap method the opposite is true: the price effect every first quarter is controlled for but consistency with annual chained volumes must be restored through benchmarking.

We display on a simulation exercise (section 3) the common features of these chain-linking techniques: both produce non additive volumes and a trend effect appears when prices of component have diverging dynamics. Simulated variances of these two effects increases away from the reference year and can be sizeable on both ends of time series. These simulations allow us to compare the two techniques and analyse the effect of benchmarking on the one quarter overlap.

With respect to its one quarter overlap alternative, the annual overlap method has two advantages that, to the best of our knowledge have not been put forth until now in the literature on chain-linking.

First in section 4 we show how chain-linking can interact, with some unpleasant outcome, with trading day or seasonal adjustment. With the annual overlap, which uses an annual link factor, it is possible to avoid these issues. With the one quarter overlap, which uses a quarterly chain-link factor, these issues can not be circumvented. The one quarter overlap hence raises additional issues of revisability, precision and quality.

Second, in the case of the annual overlap method, additive contributions to the growth rate of an aggregate can be computed (section 5). The lack of additivity makes drawing up and publishing the accounts a complex operation as some aggregates are unsuitable for chain-linking. Computing additive contributions of a component to the growth rate of an aggregate overcomes this difficulty. But, for one quarter overlap volumes, these contributions are only approximative, which does not allow to accurately compute the contribution of the trade balance to GDP growth for instance.

2 Computing chain-linked estimates

In this section we recall the algebra for chain-linking, first in the case of annual accounts, then for quarterly accounts in annual overlap and one quarter overlap.

2.1 Volume indexes in annual accounts

For sake of clarity, we introduce concepts of volume with elementary goods or services, for which there exists a price and can be measured a quantity (e.g. potatoes, books, haircuts...). Let X denote an aggregate, p a price, q a quantity. Hereafter a shall refer to a generic year while 0 refers to the reference year. Later on, a, t refers to quarter $t \in [1, 2, 3, 4]$ of year a.

Let Val refer to values (i.e. current prices). We denote volumes as follows:

- Volumes at constant prices of the reference year (Cst): $X_a^{Cst} = p_0 q_a$
- Chain-linked volumes at previous year's prices (Ch): $X_a^{Ch} = I_a^{Vol} X_{a-1}^{Ch}$, where $I_a^{Vol} = \frac{X_a^{Pyp}}{X_{a-1}^{Val}}$ is the growth rate index of volumes at previous year's prices and volumes at previous year's prices (Pyp) are defined by $X_a^{Pyp} = p_{a-1} q_a$

Volumes at previous year's prices can not be treated as standard time series since there is a change of prices and volumes every period. Chain-linking overcomes this difficulty by *chaining* the growth rates measured at previous year's prices.

Elementally, volumes coincide:

$$I_a^{VolCst} = \frac{X_a^{Cst}}{X_{a-1}^{Cst}} = \frac{q_a}{q_{a-1}} = \frac{X_a^{Pyp}}{X_{a-1}^{Val}} = I_a^{VolCh}$$

Imposing the reference year at current prices as the reference for all volumes, we have:

$$X_a^{Cst} = X_0^{Cst} \prod_{k=1}^{a} I_k^{VolCst} = X_0^{Ch} \prod_{k=1}^{a} I_k^{VolCh} = X_0^{Val} \prod_{k=1}^{a} I_k^{Vol}$$

that is chained-linked volumes and volumes at constant prices are equal.

Individual products hardly exist (potatoes come in different varieties, haircuts differ from one hairdresser to another...) and such a data collection would be impossible. In practice, National Accounts work on detailed levels which are already aggregates of goods or services but the previous concepts can be generalized to aggregates measured at current prices and trends in average prices measured by price indexes. One simply has to choose the most detailed levels he is willing to work on and define volumes as the ratio of values with the corresponding price index. By construction, there is no ambiguity of volume concept at this level, and the issue of measuring quantities is then overcome.

On aggregate, volume growth indexes differ due to their weights...

Let $\mathcal{E}$ denote an aggregate and i its components. The growth index in volumes at constant price of an aggregate is a weighted sum of the growth indexes of the components, with weights at constant price volumes (hereafter the weight of i in $\mathcal{E}$ for year a in the concept V is denoted $\omega_a^V(i, \mathcal{E})$).

$$I_a^{VolCst}(\mathcal{E}) = \frac{\sum_{i\in\mathcal{E}} X_a^{Cst}(i)}{\sum_{i\in\mathcal{E}} X_{a-1}^{Cst}(i)} = \sum_{i\in\mathcal{E}} \frac{X_{a-1}^{Cst}(i)}{X_{a-1}^{Cst}(\mathcal{E})} I_a^{Vol}(i) = \sum_{i\in\mathcal{E}} \omega_{a-1}^{Cst}(i,\mathcal{E}) I_a^{Vol}(i)$$

The growth index in volumes at previous year's prices on aggregate is a weighted sum of the growth indexes of the components, with weights at current prices for the previous period.

$$I_a^{VolCh}(\mathcal{E}) = \frac{\sum_{i\in\mathcal{E}} X_a^{Pyp}(i)}{\sum_{i\in\mathcal{E}} X_{a-1}^{Val}(i)} = \sum_{i\in\mathcal{E}} \frac{X_{a-1}^{Val}(i)}{X_{a-1}^{Val}(\mathcal{E})} I_a^{Vol}(i) = \sum_{i\in\mathcal{E}} \omega_{a-1}^{Val}(i,\mathcal{E}) I_a^{Vol}(i)$$

...and volumes in level no longer coincide

$$X_a^{Ch} = X_0^{Ch} \prod_{k=1}^{a} I_k^{VolCh} \neq X_0^{Cst} \prod_{k=1}^{a} I_k^{VolCst} = X_a^{Cst}$$

Chain-linked volumes at the previous year's prices are also initialized $X_0^{Ch} = X_0^{Val}$. Since $X_0^{Cst} = X_0^{Val}$ as well, Ch and Cst only differ by the structure of weights in their respective growth index. In Ch weights evolve with time according to both volume and price changes. For this reasons, in comparison with Cst, Ch are said to better account for the change in the structure of the economy.

2.2 Volumes in quarterly accounts

Current prices, constant prices and previous year's prices can be generalized to higher frequencies (quarterly or monthly). However, there are several chain-linking techniques. We do not treat in this document the cases for *over the quarter overlap* and *over the year overlap* because these techniques are seldom used and not recommended ([Eurostat, 2013], [Bloem et al., 2001]). We consider the two cases of *annual overlap* and *one quarter overlap* which are most commonly used (see Table 2). Contrary to the former two techniques, these two cases yield aggregates which are additive within a year.

2.2.1 The annual overlap method X^{Ch}

To compute quarterly aggregates in annual overlap (hereafter denoted X^{Ch}), one shall:

1. Compute quarterly volumes at previous year's prices for elementary components: $X_{a,t}^{Pyp}(i) = X_{a,t}^{Cst}(i)\frac{X_{a-1}^{Val}(i)}{X_{a-1}^{Cst}(i)}$

2. Then by sum, compute all aggregates at previous year's prices $X_{a,t}^{Pyp}(\mathcal{E}) = \sum_{i\in\mathcal{E}} X_{a,t}^{Pyp}(i)$

3. For each aggregate, chain-link from the reference year (for which Val=Cst=Ch, currently 2010 for France):

$$X_{a,t}^{Ch} = X_{a,t}^{Pyp}\frac{X_{a-1}^{Ch}}{X_{a-1}^{Val}} = \frac{X_{a,t}^{Pyp}}{X_{a-1}^{DefCh}} \quad (1)$$

with X_a^{DefCh} the annual chained deflator, also called annual link factor. Note that the link factor is based on annual accounts so that in particular seasonal adjustment has no effect on chain-linking.[1]

Comparison with annual computations shows that previous year price estimates can be summed to retrieve their annual counterpart: $X_a^{Pyp} = \sum_{t=1}^4 X_{a,t}^{Pyp}$. It directly follows that chain-linked estimates can also be summed to retrieve their annual counterpart: $X_a^{Ch} = \sum_{t=1}^4 X_{a,t}^{Ch}$.

Change of year effect

Between Q4 and Q1, the transition from volumes at previous year's prices to chain-linked volumes entails a price correction to the chain-linked volume growth rate corresponding to the growth of the annual link factor:

$$\begin{aligned}\frac{X_{a,1}^{Ch}}{X_{a-1,4}^{Ch}} &= \frac{X_{a,1}^{Pyp}}{X_{a-1,4}^{Pyp}} \frac{X_{a-1}^{Ch}}{X_{a-1}^{Val}} \frac{X_{a-2}^{Val}}{X_{a-2}^{Ch}} \\ &= \frac{X_{a,1}^{Pyp}}{X_{a-1,4}^{Pyp}} \frac{X_{a-1}^{Pyp}}{X_{a-1}^{Val}} \frac{X_{a-2}^{Val}}{X_{a-2}^{Val}} \qquad \text{since} \quad \frac{X_{a-1}^{Ch}}{X_{a-2}^{Ch}} = \frac{X_{a-1}^{Pyp}}{X_{a-2}^{Val}} \\ &= \frac{X_{a,1}^{Pyp}}{X_{a-1,4}^{Pyp}} \frac{1}{I_{a-1}^{DefCh}}\end{aligned}$$

with $I_a^{DefCh} = \frac{X_a^{Val}}{X_a^{Pyp}} = \frac{X_a^{DefCh}}{X_{a-1}^{DefCh}}$ the annual deflator. This price correction eliminates the change in prices every year incorporated in previous year's prices estimates. However, in this price correction, there is a weighting effect:

$$\begin{aligned}\frac{X_{a,1}^{Ch}(\mathcal{E})}{X_{a-1,4}^{Ch}(\mathcal{E})} &= \frac{X_{a,1}^{Pyp}(\mathcal{E})}{X_{a-1,4}^{Pyp}(\mathcal{E})} \frac{X_{a-1}^{Pyp}(\mathcal{E})}{X_{a-1}^{Val}(\mathcal{E})} = \frac{\sum_{i\in\mathcal{E}} X_{a,1}^{Pyp}(i)}{\sum_{i\in\mathcal{E}} X_{a-1,4}^{Pyp}(i)} \frac{\sum_{i\in\mathcal{E}} X_{a-1}^{Pyp}(i)}{\sum_{i\in\mathcal{E}} X_{a-1}^{Val}(i)} \\ &= \frac{\sum_{i\in\mathcal{E}} \omega_{a-1}^{Val}(i,\mathcal{E}) \frac{X_{a,1}^{Pyp}(i)}{X_{a-1}^{Val}(i)}}{\sum_{i\in\mathcal{E}} \omega_{a-1}^{Pyp}(i,\mathcal{E}) \frac{X_{a-1,4}^{Pyp}(i)}{X_{a-1}^{Pyp}(i)}}\end{aligned}$$

One part of the growth rate of the first quarter is therefore due to the difference in weights between Q1 and Q4. This issue is specific to the first quarters since for the following quarters, the weights are identical.

[1] Provided that seasonally adjusted accounts are benchmarked on their non-adjusted counterparts as recommended by international standards [Eurostat, 2013].

2.2.2 The one quarter overlap method $\tilde{X}^{Ch}$

One may want to have no ponderation effect in the price correction between Q4 and Q1. This is the purpose of the one quarter overlap method (hereafter denoted $\tilde{X}^{Ch}$).
To do so, one *simply* has to redefine the annual link factor. The new link factor is another annual chained price deflator using Q4 ponderation at previous year's prices ($\tilde{X}_a^{DefCh}$).
Its growth differs from that of the previous link factor as follows:

$$\tilde{I}_a^{DefCh} = \sum_{i\in\mathcal{E}} \omega_{a,4}^{Pyp}(i,\mathcal{E}) \frac{X_a^{Val}(i)}{X_a^{Pyp}(i)} \tag{2}$$

$$\text{instead of } I_a^{DefCh} = \frac{X_a^{Val}}{X_a^{Pyp}} = \sum_{i\in\mathcal{E}} \omega_a^{Pyp}(i,\mathcal{E}) \frac{X_a^{Val}(i)}{X_a^{Pyp}(i)}$$

One can then compute the chain-linked volumes identically using $\tilde{X}_a^{DefCh}$ instead of X_a^{DefCh}. The chain-linking formula (1) becomes:

$$\tilde{X}_{a,t}^{Ch} = \frac{X_{a,t}^{Pyp}}{\tilde{X}_{a-1}^{DefCh}} \tag{3}$$

Proof that this correction is correct

$$\begin{aligned}
\frac{\tilde{X}_{a,1}^{Ch}(\mathcal{E})}{\tilde{X}_{a-1,4}^{Ch}(\mathcal{E})} &= \frac{X_{a,1}^{Pyp}(\mathcal{E})}{X_{a-1,4}^{Pyp}(\mathcal{E})} \frac{1}{\tilde{I}_{a-1}^{DefCh}(\mathcal{E})} \\
&= \frac{\sum_{i\in\mathcal{E}} X_{a,1}^{Pyp}(i)}{X_{a-1,4}^{Pyp}(\mathcal{E}) \sum_{i\in\mathcal{E}} \omega_{a-1,4}^{Pyp}(i,\mathcal{E}) \frac{X_{a-1}^{Val}(i)}{X_{a-1}^{Pyp}(i)}} \\
&= \frac{\sum_{i\in\mathcal{E}} X_{a,1}^{Pyp}(i)}{\sum_{i\in\mathcal{E}} X_{a-1,4}^{Pyp}(i) \frac{X_{a-1}^{Val}(i)}{X_{a-1}^{Pyp}(i)}} = \frac{\sum_{i\in\mathcal{E}} X_{a,1}^{Pyp}(i)}{\sum_{i\in\mathcal{E}} X_{a-1}^{Val}(i) \frac{X_{a-1,4}^{Pyp}(i)}{X_{a-1}^{Pyp}(i)}} \\
&= \frac{\sum_{i\in\mathcal{E}} \omega_{a-1}^{Val}(i,\mathcal{E}) \frac{X_{a,1}^{Pyp}(i)}{X_{a-1}^{Val}(i)}}{\sum_{i\in\mathcal{E}} \omega_{a-1}^{Val}(i,\mathcal{E}) \frac{X_{a-1,4}^{Pyp}(i)}{X_{a-1}^{Pyp}(i)}} \qquad \blacksquare
\end{aligned}$$

Contrary to the annual overlap method, with the one quarter overlap method, the sum of the four quarters do not match the annual estimate of chain-linked volumes because the link factor is different. For this reason one quarter overlap estimates are usually benchmarked *ex-post* on their annual counterpart. In the present paper, we do not compare or expose the different techniques to do so: this is done for instance in [Eurostat, 2013].

3 A simulation exercise

To assess the properties of chain-linking, we perform a simulation exercise.[2] We simulate data sets for two elementary accounts which we aggregate using the different concepts of volume. The parameters of the simulation are calibrated to replicate standard elements of national accounts in developed economies.[3] The data are simulated over a time period consistent with Eurostat's minimal request, that is since 1995.

The simulations exemplify the following properties:

- the non additivity of chain-linked volumes
- how chain-linking can modify the trend of volume estimates compared to volumes at constant prices of the reference year
- the differences between annual and one quarter overlap
- the ex-post benchmarking of one quarter overlap

Loss of additivity

The non-additivity associated with chain indices has been a major point of criticism [Schreyer, 2004]. Either in annual or quarterly accounts, with any concept of chain-linking, chain-linked volumes of 2 aggregates can not be added.

To aggregate (or subtract) 2 accounts, one must first *unchain* them, i.e. compute the previous year's prices which are additive before chain-linking the aggregate.[4]

When bluntly adding up two chain-linked volumes, one makes an error which we exemplify on Figure 1. In annual overlap, the error is null the

[2] The corresponding R code is available upon request.

[3] The growth rates in volume and prices are equal to 2% in annual in the standard case, the standard deviation is quarterly is 0.5%.

[4] A practical advantage of the annual overlap over the one quarter overlap technique is that since the former are not benchmarked ex-post on their annual counterpart, final users of the data can perform this operation themselves.

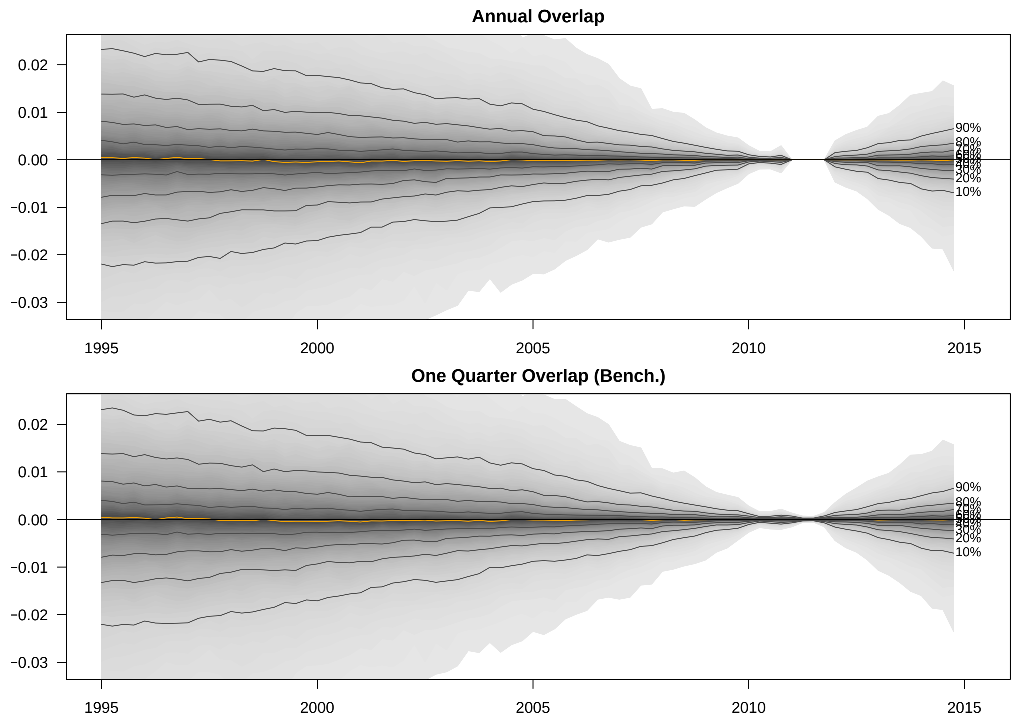


Figure 1: Error made when adding up chain-linked volumes directly

year after the reference year (2010). Indeed, this year chain-linked volumes are equal to volumes at previous year's prices which are additive (that year the chain-linking factor in equation (1) is equal to one by definition of the reference year). The variance of the error increases away from that date. A decade before (or after) the reference point, the error has roughly a 50% chance to be larger than 0.01% in absolute terms. The same diagnostic holds in one quarter overlap, although the error is not null the year after the reference year.

Trend correction of chain-linking

Because the weights of the growth index of chain-linked volumes account for both changes in prices and volumes, compared to volumes at constant prices, chain-linked volumes can display sizeable trend differences. To better exemplify this trend difference, we simulate two aggregations:

- a *symmetric* one, where both of its components grow on average at a 0.5% quarterly rate in volume and prices,

- an *asymmetric* one, where one component grows at 0.5% quarterly rate in volume and prices and the other increases faster in volume (+0.75% quarterly rate) and decreases in prices (-0.25% quarterly rate).

This asymmetric aggregation mimics the case of durables and new technologies aggregated with otherwise standard goods and services, which is a characteristic example of the trend effect.

In level for the symmetric case (Figure 2, top left and right), the effect of chain-linking is centered around 0 with both methods but its variance increases away from the reference year. Roughly speaking, a decade away from the reference year, chain-linked volumes have a 50% chance of being in absolute terms 0.5% away from volumes at constant prices, whether it is a positive or negative discrepancy. At the same time, the effect of chain-linking on growth rates (Figure 3) has a 50% chance of being larger than 0.01% in absolute term. It is noteworthy that our simulations are calibrated on standard deviations observed on French data. Other simulations with higher variances show that for energy, commodities, or developing countries the distribution effects exposed throughout the present paper can be magnified more than tenfold.

In the asymmetric case the consequence of chain-linking is also heteroskedastic, but there is an additional trend correction. Chain-linked volumes grow more rapidly than volumes at constant prices before the reference year and the opposite is true after this year. The median of this trend correction is 0.5% a decade away from the reference year.

Comparison of annual and one quarter overlap

As expected from the theory, the difference between the two chain-linking method in growth rate appears only on the first quarters of every year (Figure 3, bottom left).

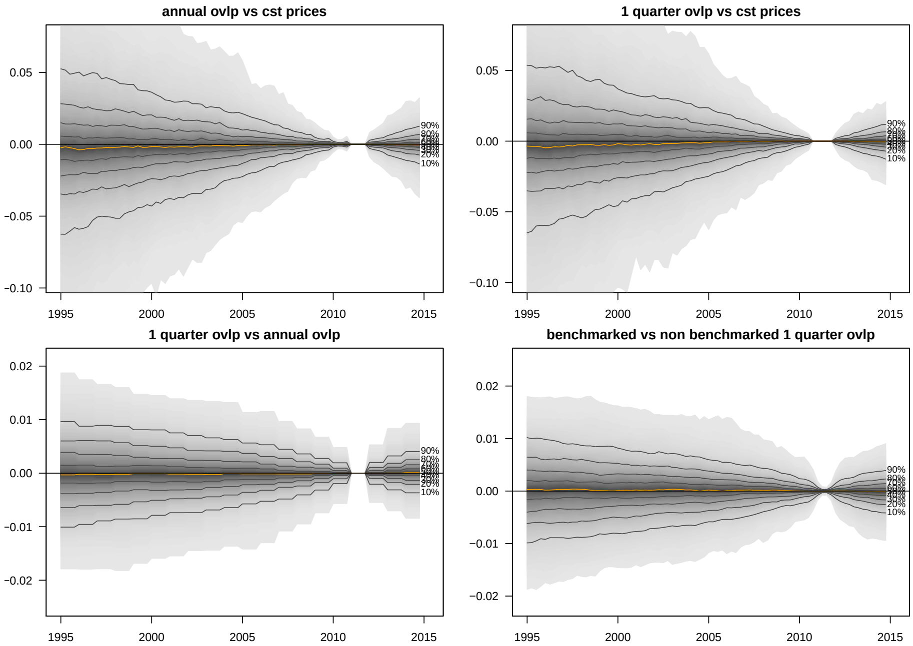
In level, this difference between the two chain-linking methods are smaller than the difference between constant prices and chained linked aggregates (Figure 2, bottom left). This difference derives from the difference between the chain-link factors of the two techniques which are cumulated by the chain-linking process. Also, since the annual overlap method is consistent with the annual chain-linking, this difference, in annual terms, is equal to the benchmarking residual which can be eliminated *ex-post* to impose consistency with annual accounts in the one quarter overlap case.

Benchmarking the one quarter overlap

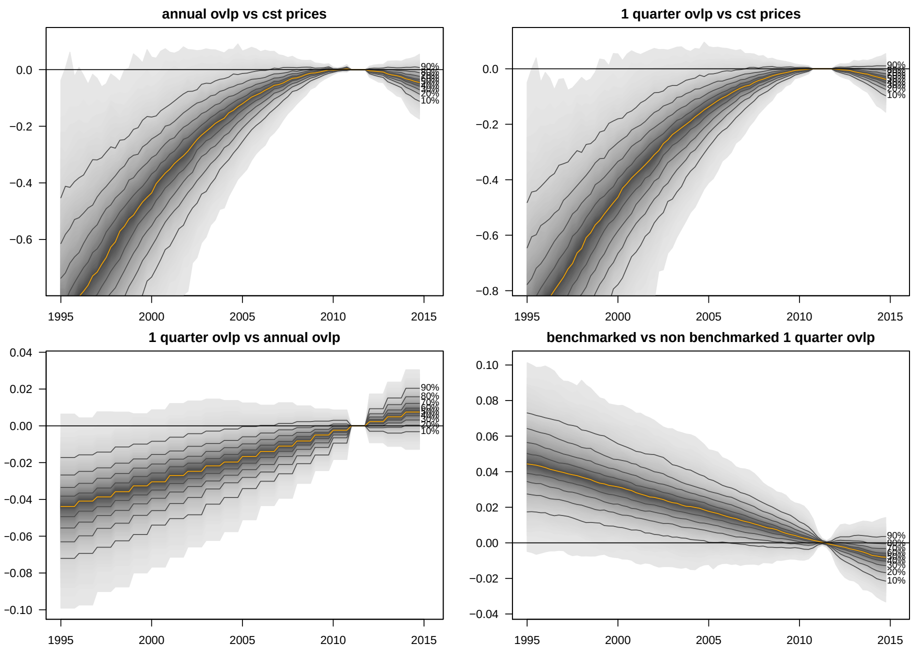
Benchmarking one quarter overlap has, with the method used here,[5] a limited effect on growth rates (Figure 3, bottom right).

It is however noteworthy that in level this *ex-post* benchmarking is a first order integrated correction. As for the other effects we exemplify with our simulations, the variance of the correction increases away from the reference year (Figure 2, bottom right). On both ends of chain-linked volume time series, possible sizeable level correction may ensue. In this case the correction in level will necessarily modify the short term fluctuations either in delta or in growth rates, magnifying or lessening them depending on the direction of the level correction and the use of an additive or multiplicative benchmarking method. Because they modify the homogeneity of the variance one may extract from the QNA, the choice of one benchmarking technique or another is not neutral for economic analysis, whether one wishes to analyse the business cycle, run statistical tests...

[5] Benchamrking is based on additive Denton method [Denton, 1971].



symmetric



asymmetric

Figure 2: Comparison of volumes in levels

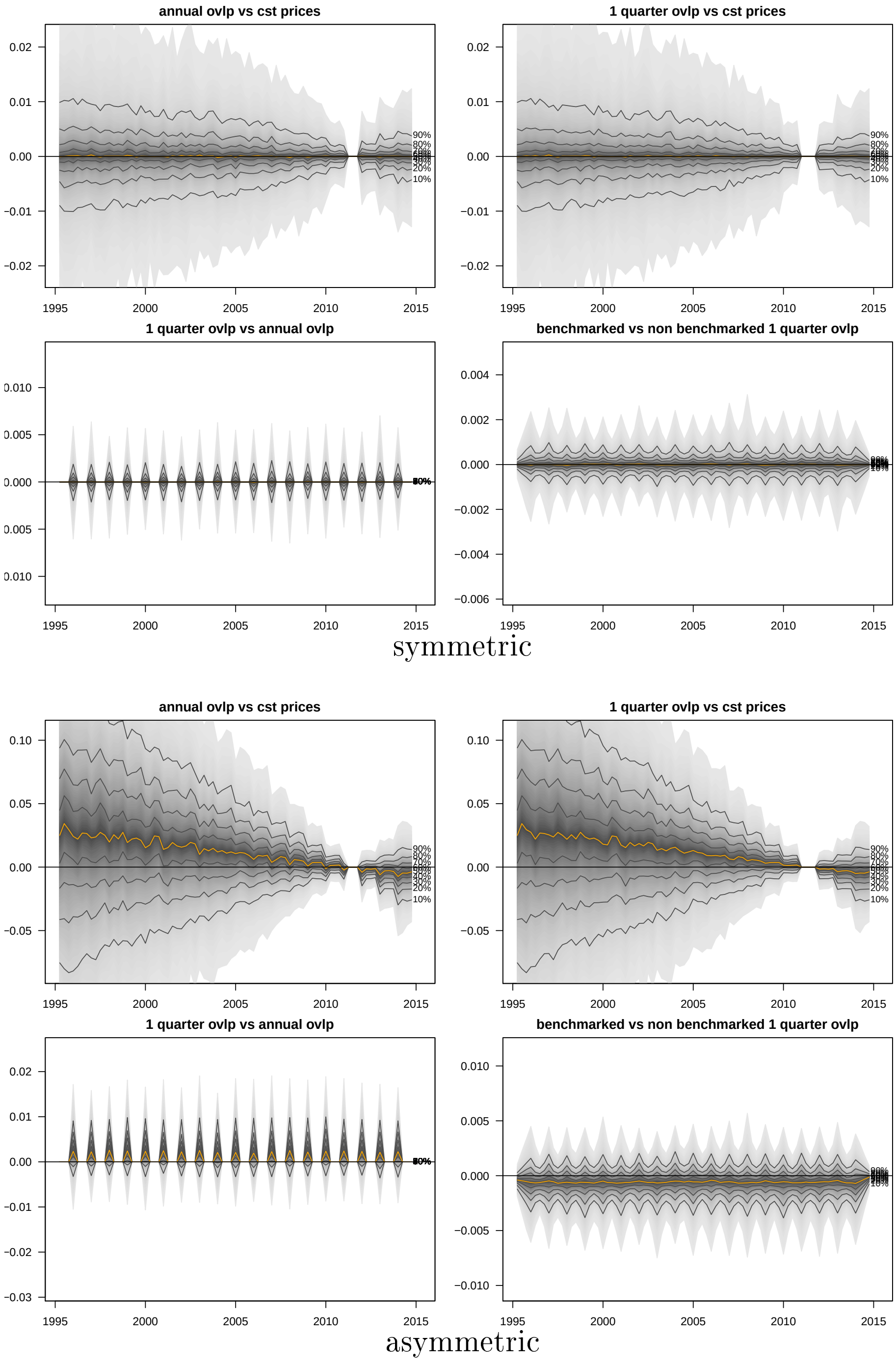


Figure 3: Comparison of volumes in growth rates

4 Chain-linking and seasonal or trading day adjustment

With annual overlap, chain-linking and seasonal adjustment do not interact if quarterly accounts are assumed to be benchmarked on their annual counterpart (as recommended by international standards). Indeed, the chain-link factor in annual overlap is based on annual estimates so is identical whether it is computed with raw or seasonally adjusted data (see eq (1)).

However, in equation (1) the question arises of using a trading day adjusted chain-link factor in addition to trading-day adjusted previous year's prices quarterly estimates.

Using a trading day adjusted chain-link factor is rather intuitive and easy. The chain-linked aggregate is then calculated as follows:

$$X_{a,t}^{Ch,TDA}(\mathcal{E}) = \frac{X_{a,t}^{Pyp,TDA}(\mathcal{E})}{X_{a-1}^{DefCh,TDA}(\mathcal{E})},$$

with X^{TDA} trading-day adjusted series.

Trading-day adjustment introduces only a small modification of the chain-link factor but due to chain-linking, it is cumulated over the sample. This cumulated trading-day effect is not always sizeable. For example, with this naive chain-linking, the trading-day effect on French GDP was not centered on zero in 2013 (last publication with 2005 as the reference year), but there is no visible problem after the update of the data in 2014 (first publication with reference year 2010, see Figure 4). With this chain-linking method, the update of trading-day adjustment models may result in a trend modification, while trading day adjustment should be *a priori* stationary. From one update to another, trend modifications may be sizeable on different aggregates, be either upwards or downwards and of different magnitudes.

To avoid these issues, an alternative way of chain-linking uses a raw chain-link factor:

$$X_{a,t}^{Ch,TDA}(\mathcal{E}) = \frac{X_{a,t}^{Pyp,TDA}(\mathcal{E})}{X_{a-1}^{DefCh,R}(\mathcal{E})},$$

with X^R raw series. In this case, the trading-day effect on chain-linked aggregate remains stationary: it is only due to trading-day adjustment of volumes at previous year's prices.

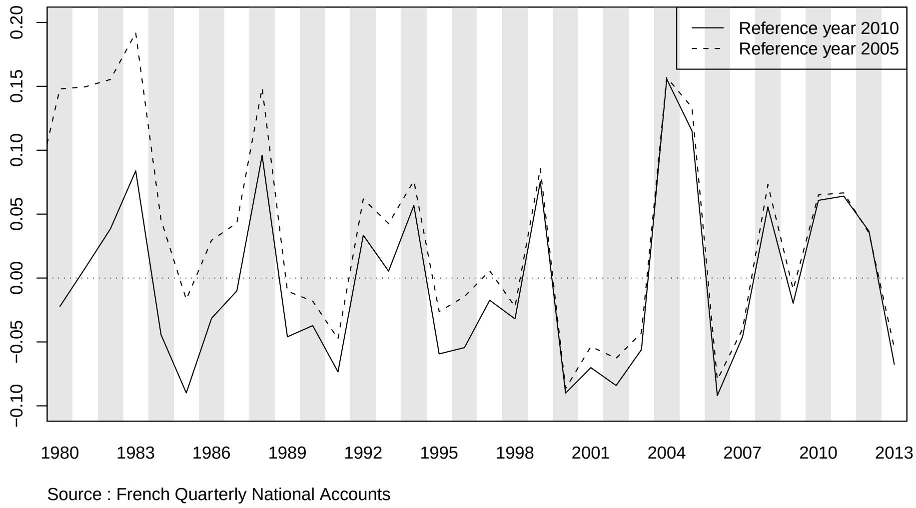


Figure 4: Comparison of trading day effects on French GDP, chain-linked volumes, naive chain-linking

To illustrate further the consequence of the choice between raw and trading-day adjusted chain-link factor, we perform a bootstrap exercise. The trading-day effect on French GDP at previous year's prices is estimated through an OLS model, and the residuals of the estimation are bootstrapped.[6] This allows us to simulate a sample which replicates the empirical uncertainty of trading day adjustment. These trading-day adjusted series are used to calculate two samples of chain-linked aggregates: the first one using a trading-day adjusted chain-linking factor (naive chain-linking), and the second one using a raw factor (correct chain-linking). Then, the distributions of the trading-day effects on chain-linked aggregate can be plotted (Figure 5).

For the intuitive chain-linking, the variance of the trading-day effect increases away from the reference year, whereas with the alternative chain-linking, the trading-day effect is clearly stationary. A first advantage of the method based on a raw chain-link factor is that it can not introduce an undesirable drift in the trading day adjusted data. In addition, bootstrapping shows that naive chain-linking increases the uncertainty of the estimates. It does so by introducing a first order integrated correction in level. Compared

[6]The trading day effect is computed from trading-day and non trading day adjusted GDP and regressed on the calendar. The residuals (that is, 408 points from January 1980 to December 2013) are bootstrapped, and then aggregated in yearly series. In each case, a sample of 1000 simulations is created.

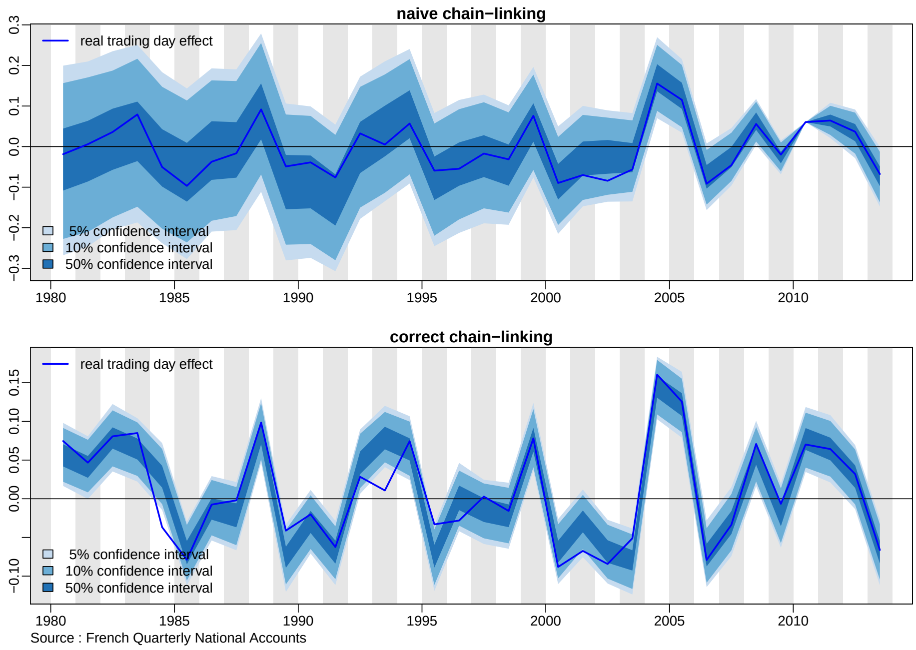


Figure 5: Simulated trading day effect on French GDP, chain-linked volumes

to the similar effect observed between the annual and one quarter overlap techniques, this correction is however much larger (tenfold) and alteration of the statistical properties of the series will be problematic if this undesired effect is corrected through benchmarking.

By construction of the chain-link factor, the one quarter overlap technique cumulates the two issues of trading-day and seasonal adjustment in the definition of the chain-link factor (see eq (2)).

First, the issue of trading-day adjustment is the same as in the annual overlap: the uncertainty of adjustment is amplified by chain-linking if a trading-day adjusted chain-link factor is used.

Second, a similar issue is added by seasonal adjustment, because the chain-link factor is quarterly and not annual. For statistical reasons, it seems better to use a non seasonally-adjusted factor, in order not to amplify the adjustment uncertainty and the alteration of the initial statistical properties. On the other hand, a raw factor may be based on a weighting structure which is not representative of the economy and affect the trend of the series (especially if seasonality is changing). None of the two options is fully satisfying: in both cases, the benchmarking on annual series is a trend correction which may modify the variance of quarterly fluctuations, with consequences for data users.

5 Computing additive contributions to growth

We illustrated on the simulations that chain-linked volumes are not additive. It follows that accounting equalities are not verified in chain-linked volumes which can cause some difficulties in aggregating, balancing... and most importantly for users. Moreover, chain-linking misbehaves for aggregates which change signs or are temporarily equal to zero. Hence, changes in inventories or trade balance are usually not chain-linked. To overcome these difficulties, it is possible to compute accurately contribution to the growth rate of a larger aggregate.

5.1 Annual

As we noted earlier (subsection 2.1), in chain-linked volumes ponderations are based upon **current prices** where they are based upon volumes at constant prices for this other concept of volumes. This property shows in the computation of contributions to growth.

Let $ev()$ denote the growth rate operator. For additive concepts (e.g. values and volumes at constant prices) the contribution of the component i to the aggregate $\mathcal{E}$ can be computed easily:

$$\text{Contrib}_a^{Val}(i,\mathcal{E}) = \frac{X_{a-1}^{Val}(i)}{X_{a-1}^{Val}(\mathcal{E})} ev(X_a^{Val}(i)) = \omega_{a-1}^{Val}(i,\mathcal{E}) ev(X_a^{Val}(i))$$

For additive concepts, the contribution to growth is the component's growth rate times its weight in the aggregate in the same additive concept at the previous period.

For chain-linked aggregates, contributions to growth are slightly more complex. The growth rate of a chained-linked aggregate can be written as follows:

$$ev(X_a^{Ch}(\mathcal{E})) = \frac{X_a^{Vol}(\mathcal{E})}{X_{a-1}^{Val}(\mathcal{E})} - 1 = \sum_{i\in\mathcal{E}} \frac{X_a^{Vol}(i) - X_{a-1}^{Val}(i)}{\sum_{i\in\mathcal{E}} X_{a-1}^{Val}(i)}$$

Hence the contribution of i to the evolution of $\mathcal{E}$ in annual in chain-linked volumes can be defined as

$$\begin{aligned}\widetilde{\text{Contrib}}_a^{Ch}(i,\mathcal{E}) &= \frac{X_{a-1}^{Val}(i)}{X_{a-1}^{Val}(\mathcal{E})}\left(\frac{X_a^{Pyp}(i)}{X_{a-1}^{Val}(i)} - 1\right) \\ &= \omega_{a-1}^{Val}(i,\mathcal{E}) \quad ev(X_a^{Ch}(i)) \qquad (4) \\ &= \text{Contrib}_a^{Ch}(i,\mathcal{E}) \\ +\text{Contrib}_a^{Ch}(i,\mathcal{E}) &\left(\frac{X_{a-1}^{DefCh}(i)}{X_{a-1}^{DefCh}(\mathcal{E})} - 1\right) \qquad (5)\end{aligned}$$

As said, ponderations are in values, not in volumes (see equation (4)). Contributions can also be computed by applying a correction to the additive formula which corresponds to the component's price relative drift (see equation (5)).

5.2 With annual overlap

5.2.1 For quarters 2 to 4 in annual overlap X^{Ch}

Within a year ($t \neq 1$), the growth rate of chain-linked volumes equals that of previous year's prices volumes. In addition, previous year's prices volumes are additive, so one can easily compute the contributions in chain-linked volumes as those at previous year's prices volumes:

$$\widetilde{\text{Contrib}}_{a,t}^{Ch}(i,\mathcal{E}) = \text{Contrib}_{a,t}^{Pyp}(i,\mathcal{E}) = \frac{X_{a,t}^{Pyp}(i) - X_{a,t-1}^{Pyp}(i)}{X_{a,t-1}^{Pyp}(\mathcal{E})}$$

These contributions can be written in terms of chain-linked volumes using equation (1):

$$\begin{aligned}X_{a,t}^{Vol} &= X_{a,t}^{Ch} * X_{a-1}^{DefCh} \qquad \Longrightarrow \\ \widetilde{\text{Contrib}}_{a,t}^{Ch}(i,\mathcal{E}) &= \frac{X_{a,t}^{Ch}(i)X_{a-1}^{DefCh}(i) - X_{a,t-1}^{Ch}(i)X_{a-1}^{DefCh}(i)}{X_{a,t-1}^{Ch}(\mathcal{E})X_{a-1}^{DefCh}(\mathcal{E})} \\ &= \frac{X_{a-1}^{DefCh}(i)}{X_{a-1}^{DefCh}(\mathcal{E})}\frac{X_{a,t}^{Ch}(i) - X_{a,t-1}^{Ch}(i)}{X_{a,t-1}^{Ch}(\mathcal{E})}\end{aligned}$$

We can then write

$$\widetilde{\text{Contrib}}^{Ch}_{a,t}(i,\mathcal{E}) = \text{Contrib}^{Ch}_{a,t}(i,\mathcal{E}) + \text{Contrib}^{Ch}_{a,t}(i,\mathcal{E})\left(\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})} - 1\right) \quad (6)$$

In this expression similar to the annual case, the first term is the contribution in the additive case, the second term a correction for non-additivity. This correction will be sizeable only for components for which prices departs from those of the aggregate.

5.2.2 For the first quarter in annual overlap (X^{Ch})

If $t = 1$ the change in prices between the two periods modifies the computation made above.

$$\begin{aligned} ev(X^{Ch}_{a,1}(\mathcal{E})) &= \frac{X^{Ch}_{a,1}(\mathcal{E}) - X^{Ch}_{a-1,4}(\mathcal{E})}{X^{Ch}_{a-1,4}(\mathcal{E})} \\ &= \frac{\frac{X^{Pyp}_{a,1}(\mathcal{E})}{X^{DefCh}_{a-1}(\mathcal{E})} - \frac{X^{Pyp}_{a-1,4}(\mathcal{E})}{X^{DefCh}_{a-2}(\mathcal{E})}}{X^{Ch}_{a-1,4}(\mathcal{E})} \\ &= \frac{\frac{\sum_{i\in\mathcal{E}} X^{Pyp}_{a,1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})} - \frac{\sum_{i\in\mathcal{E}} X^{Pyp}_{a-1,4}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}}{X^{Ch}_{a-1,4}(\mathcal{E})} \end{aligned}$$

One can then compute the contribution as

$$\begin{aligned} \widetilde{\text{Contrib}}^{Ch}_{a,1}(i,\mathcal{E}) &= \frac{\frac{X^{Pyp}_{a,1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})} - \frac{X^{Pyp}_{a-1,4}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}}{X^{Ch}_{a-1,4}(\mathcal{E})} \\ &= \frac{X^{Ch}_{a,1}(i)\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})} - X^{Ch}_{a-1,4}(i)\frac{X^{DefCh}_{a-2}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}}{X^{Ch}_{a-1,4}(\mathcal{E})} \\ &= \frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})}\frac{X^{Ch}_{a,1}(i) - X^{Ch}_{a-1,4}(i)}{X^{Ch}_{a-1,4}(\mathcal{E})} \\ &+ \frac{X^{Ch}_{a-1,4}(i)}{X^{Ch}_{a-1,4}(\mathcal{E})}\left(\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})} - \frac{X^{DefCh}_{a-2}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}\right) \end{aligned}$$

The first term is the same contribution as in quarters 2 to 4, the second term is a correction for the change in relative prices across the years. This additional term can have a marked impact every first quarter and even in extreme cases modify the sign of the contribution [Arnaud, 2007].

One can correct this undesired effect neutrally over the aggregate with a simple subtraction:

$$\frac{X^{Ch}_{a-1,4}(i)}{X^{Ch}_{a-1,4}(\mathcal{E})}\left(\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})}-\frac{X^{DefCh}_{a-2}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}\right) \quad \text{becomes}$$

$$\left(\frac{X^{Ch}_{a-1,4}(i)}{X^{Ch}_{a-1,4}(\mathcal{E})}-\frac{X^{Ch}_{a-1}(i)}{X^{Ch}_{a-1}(\mathcal{E})}\right)\left(\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})}-\frac{X^{DefCh}_{a-2}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}\right)$$

Since $X^{Val}_{a-1} = X^{Ch}_{a-1}X^{DefCh}_{a-1}$ and $X^{Pyp}_{a-1} = X^{Ch}_{a-1}X^{DefCh}_{a-2}$ this new term is the differential of ponderation of i in $\mathcal{E}$ in values and previous year's prices volumes $(\omega^{Val}_{a-1}(i,\mathcal{E}) - \omega^{Pyp}_{a-1}(i,\mathcal{E}))$, which sums to zero over the aggregate. Hence, this technique minimizes the over-the-year effects on contributions as $\frac{X^{Ch}_{a-1,4}(i)}{X^{Ch}_{a-1,4}(\mathcal{E})} - \frac{X^{Ch}_{a-1}(i)}{X^{Ch}_{a-1}(\mathcal{E})}$ becomes a second order correction. In addition, these contributions are additive without any approximation.

5.3 General formula for contributions in chain-linked volumes

With annual overlap

All in all, the contribution of i to the growth of $\mathcal{E}$ in annual overlap chain-linked volumes is:

$$\widetilde{\text{Contrib}}^{Ch}_{a,t}(i,\mathcal{E}) = \begin{array}{l} \text{Contrib}^{Ch}_{a,t}(i,\mathcal{E}) \\ +\text{Contrib}^{Ch}_{a,t}(i,\mathcal{E})\left(\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})}-1\right) \\ +\delta_{t=1}\left(\frac{X^{Ch}_{a-1,4}(i)}{X^{Ch}_{a-1,4}(\mathcal{E})}-\frac{X^{Ch}_{a-1}(i)}{X^{Ch}_{a-1}(\mathcal{E})}\right)\left(\frac{X^{DefCh}_{a-1}(i)}{X^{DefCh}_{a-1}(\mathcal{E})}-\frac{X^{DefCh}_{a-2}(i)}{X^{DefCh}_{a-2}(\mathcal{E})}\right) \end{array} \quad (7)$$

with $\delta_{t=1}$ a dummy for the first quarters.

In line with section 4, we point out that annual accounts in this formula stem from the annual chain-link factor, hence if this factor is not trading day adjusted, non-trading day adjusted deflators and annual chain-linked volumes must be used in this equation.

The distributions of the three terms from equation(7) are displayed on Figure 6 for symmetric simulations. The first term is the main component of

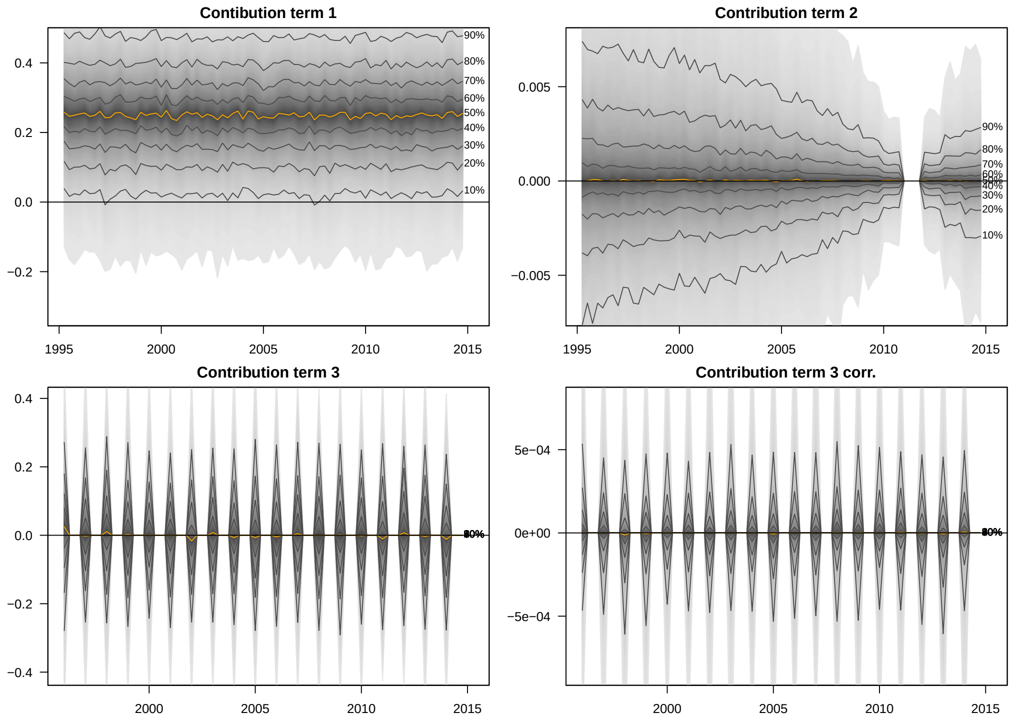


Figure 6: Three components of contribution to quarterly growth rate in annual overlap for symmetric simulations

the contribution and is on average one half of a 2% annual growth rate (0.25% quarterly contribution). The second term correspond to a trend discrepancy in deflators which resembles chain-linking effect depicted earlier. For this symmetric simulation it is very small since the prices of both components grow at the same rate on average. The third term before correction, though it is small on average, has a very large variance (comparable with the average value of the main component) but can be reduced more than a hundred fold by the correction proposed in this paper. However, contributions exactly amount to the growth rate of the aggregate with and without this correction.

Equation (7) can be adapted to compute contributions to over the year growth rates:

$$\widetilde{\text{Contrib}}_{a,t}^{Ch,yoy}(i,\mathcal{E}) = \begin{array}{l} \frac{X_{a,t}^{Ch}(i) - X_{a-1,t}^{Ch}(i)}{X_{a-1,t}^{Ch}(\mathcal{E})} \\ + \frac{X_{a,t}^{Ch}(i) - X_{a-1,t}^{Ch}(i)}{X_{a-1,t}^{Ch}(\mathcal{E})} \left(\frac{X_{a-1}^{DefCh}(i)}{X_{a-1}^{DefCh}(\mathcal{E})} - 1 \right) \\ + \left(\frac{X_{a-1,t}^{Ch}(i)}{X_{a-1,t}^{Ch}(\mathcal{E})} - \frac{X_{a-1}^{Ch}(i)}{X_{a-1}^{Ch}(\mathcal{E})} \right) \left(\frac{X_{a-1}^{DefCh}(i)}{X_{a-1}^{DefCh}(\mathcal{E})} - \frac{X_{a-2}^{DefCh}(i)}{X_{a-2}^{DefCh}(\mathcal{E})} \right) \end{array} \tag{8}$$

The same precaution as for equation (7) applies on the use of non trading-day adjusted chain-link factor.

With one quarter overlap

All the computations made for annual overlap estimates apply to the one quarter overlap estimates, with one exception, the addition of a term to the first quarter correction which is neutral over the aggregate. So much so that the contribution of i to the growth of $\mathcal{E}$ in one quarter overlap chain-linked volumes can be written:

$$\widetilde{\text{Contrib}}_{a,t}^{Ch}(i,\mathcal{E}) = \begin{array}{l} \text{Contrib}_{a,t}^{Ch}(i,\mathcal{E}) \\ + \text{Contrib}_{a,t}^{Ch}(i,\mathcal{E}) \left(\frac{\tilde{X}_{a-1}^{DefCh}(i)}{\tilde{X}_{a-1}^{DefCh}(\mathcal{E})} - 1 \right) \\ + \delta_{t=1} \frac{\tilde{X}_{a-1,4}^{Ch}(i)}{\tilde{X}_{a-1,4}^{Ch}(\mathcal{E})} \left(\frac{\tilde{X}_{a-1}^{DefCh}(i)}{\tilde{X}_{a-1}^{DefCh}(\mathcal{E})} - \frac{\tilde{X}_{a-2}^{DefCh}(i)}{\tilde{X}_{a-2}^{DefCh}(\mathcal{E})} \right) \end{array} \tag{9}$$

with $\delta_{t=1}$ a dummy for the first quarters. The three terms of contributions computed on one quarter overlap, benchmarked on their annual counterparts or not, have very similar distributions to the annual overlap case (Figures 7 and 8). In particular, the third term has a large variance compared to the first term. Hence, the correction of the third term seems mandatory to have interpretable contributions on the first quarters of each year. Contributions in one quarter overlap no longer add up to the growth rate of the aggregate.

Figure 9 displays the discrepancy between the sum of the contributions and the growth rate of the aggregate in one quarter overlap, with and without the correction to the third term and with benchmarked and non benchmarked one quarter overlap aggregates. Contributions given by equation (9) are additive prior to benchmarking one quarter overlap estimates on annual chain-linked aggregates (Figure 9, top left). However, the necessary correction to the third term of the contribution formula makes contributions no

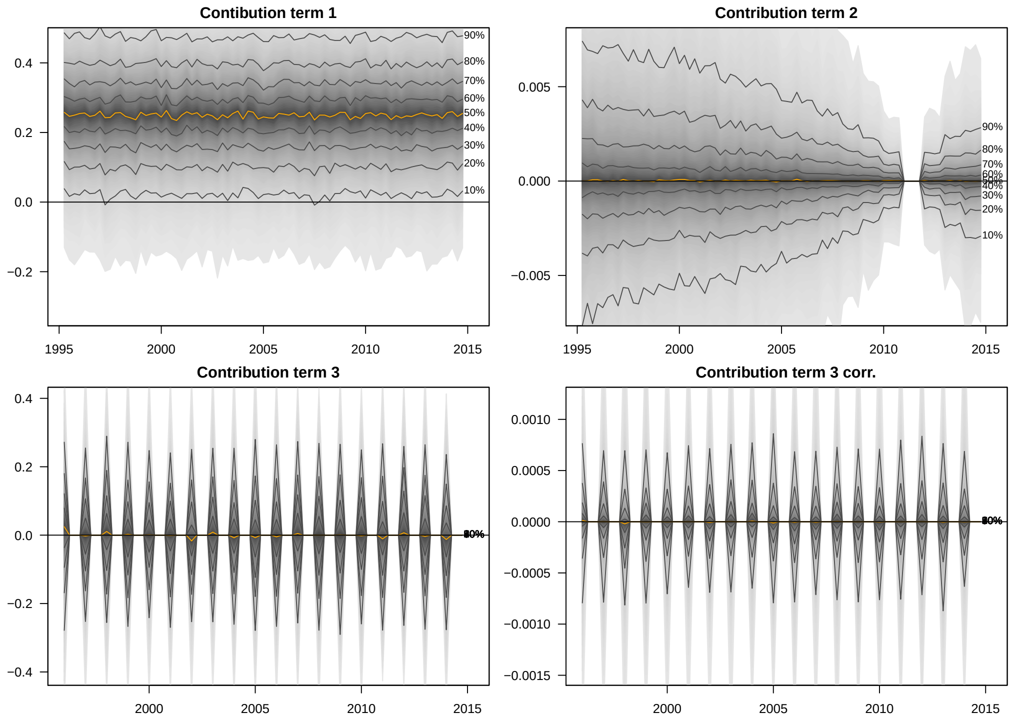


Figure 7: Three components of contribution to growth in one quarter overlap for symmetric simulations

longer additive (Figure 9, top left). When benchmarking one quarter overlap on annual chained linked volumes, because of the benchmarking residual, formula (9) is only an approximation (Figure 9, bottom left). However, the correction to the third term limits the size of this approximation (Figure 9, bottom right). Hence even for one quarter overlap, contributions are better computed with equation 7.

5.4 Comparison with an approximative formula

A common approximation for equation (7) and (9) is to apply the annual formula (4) on quarterly data:

$$\widetilde{\widetilde{\text{Contrib}}}^{Ch}_{a,t}(i,\mathcal{E}) = \omega^{Val}_{a,t-1}(i,\mathcal{E}) \quad ev(X^{Ch}_{a,t}(i)) \tag{10}$$

Figure 10 depicts the difference between the approximative formula (10) and the exact formula (7) on symmetric simulations. For the annual over-

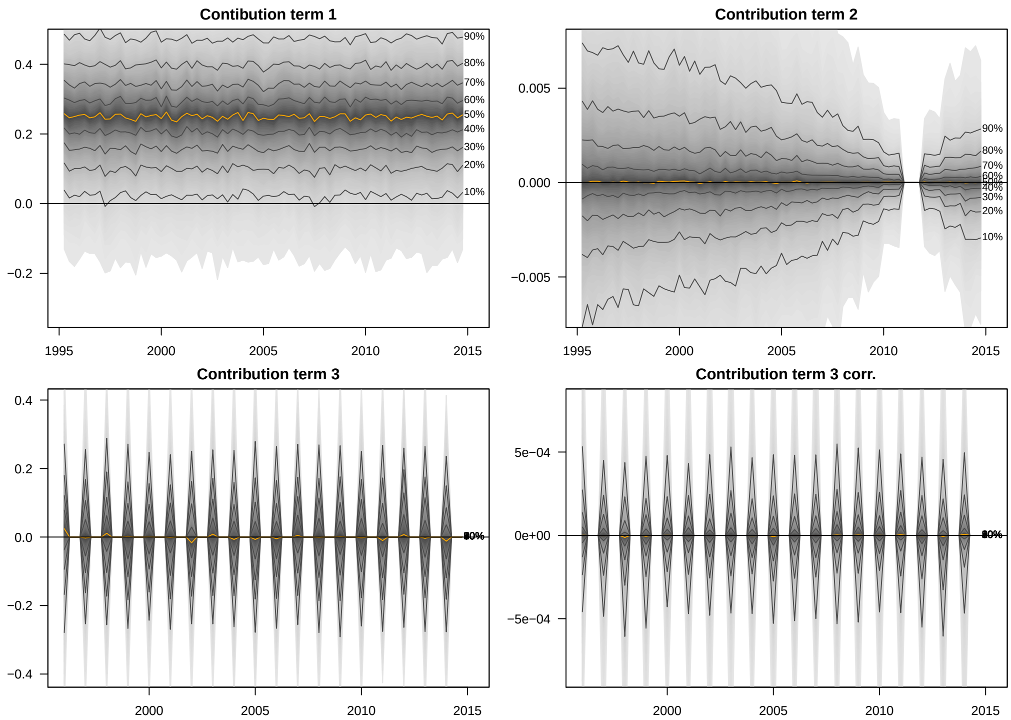


Figure 8: Three components of contribution to growth in one quarter overlap after benchmarking for symmetric simulations

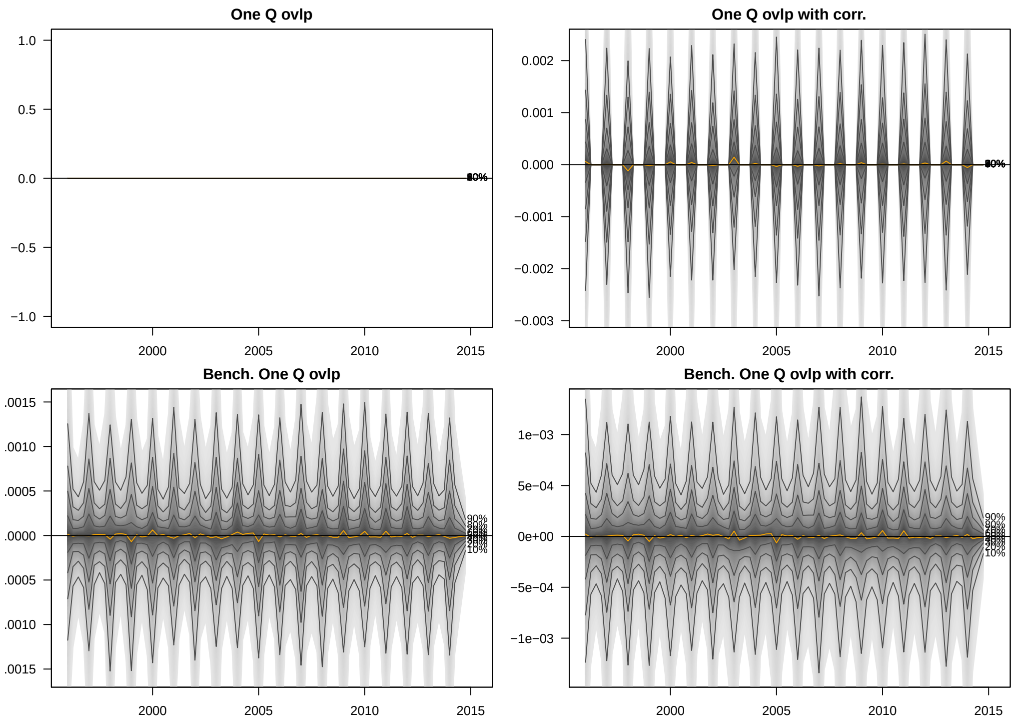


Figure 9: Residuals in contributions to growth of an aggregate in one quarter overlap for symmetric simulations

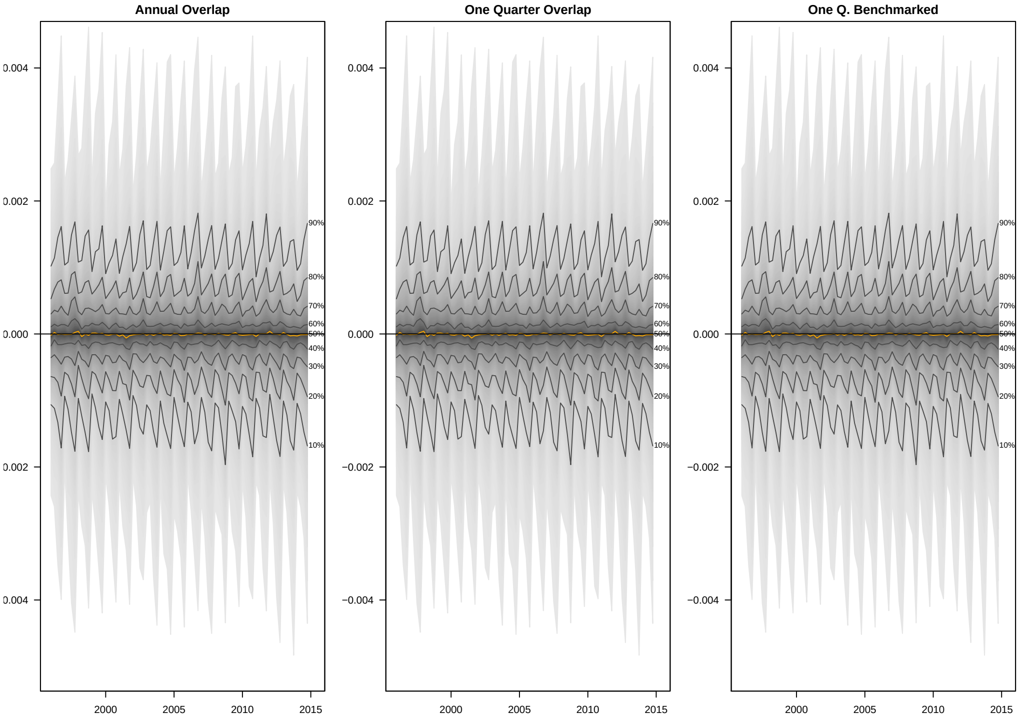


Figure 10: Comparison of approximation (10) with (7) for the computation of contribution to growth (in %)

lap and the one quarter overlap method, whether it is benchmarked or not, the approximation is quite good: the difference between the two methods is smaller than 0.002% for a contribution of 0.25% in quarterly growth rate. Hence, since formula (7) is only an approximation for the one quarter overlap case, this simpler method may be preferred. In addition to being simpler, this formula has convenient decomposition properties [Berthier, 2002].

Conclusion

With respect to one quarter overlap, the annual overlap method has the well-known advantage of naturally adding up to annual chained-linked estimates and the drawback of not correcting for a weight effect in the first quarters growth rates. We show in this paper it has two additional advantages.

First, the calculation of trading-day and seasonally adjusted series is easier with annual overlap. With both chain-linking methods, the trading-day adjustment of the chain-link factor may affect the series trend, but this issue can easily be solved by using a non adjusted chain-link factor. However, the issue of the chain-link factor seasonal adjustment, which concerns only the one quarter overlap method, is more difficult to solve. Indeed, using either a seasonally-adjusted or a raw factor is unsatisfactory, the former raises issues of revisability and precision and the trend and cycle of the series may be altered while the latter uses weights influenced by Christmas, winter temperatures...

Second, it is possible in annual overlap to compute perfectly additive contributions to growth. Our experience is that these contributions are economically relevant and the additivity enables to precisely comment the contribution of changes in inventories or trade balance to GDP for instance. This property is particularly useful for the dissemination of Quarterly National Accounts.

With one quarter overlap, calculation of contributions is plagued with more problems: exactly additive contributions can be computed but their interpretation on first quarters is doubtful. In this case, the formula proposed for annual overlap (Equation (7)) may be preferred but a simpler approximation may also be considered. Additivity is then lost even though this error is empirically small in the present simulations (generally of the order of magnitude of a first decimal rounding error on quarterly growth rates).

We can summarize the comparative advantages of the two methods in Table 1. The new properties exposed in this paper tend to tip the scales in favour of the annual overlap method, even though the relative importance of these properties remain a matter of judgement. In particular, we pointed out that benchmarking one quarter overlap chain-linked account on their annual counterpart, though it is necessary for practical reasons, should be considered with care: especially when trading-day or seasonal adjustment comes into play, this operation may substantially alter the statistical properties of

Property	Annual overlap	One quarter overlap
Additive quarter	▲	▲
Additive components	▽	▽
Consistency with annual	▲	▽
Correction of weight effect in Q1	▽	▲
Neutrality of TD-SA	▲	▽
Additive contributions to growth	▲	▽

Table 1: Comparative advantages of the one quarter and annual overlap method

the data.

We have only considered Laspeyres type indexes here as only the United States and Canada use the alternative Fisher indexes. However as they use the one quarter overlap technique for chain-linking the same issues as the ones pointed out here should apply: exactly additive contributions to growth can not be computed and chain-linking shall interact with seasonal and trading day adjustment, increasing revisability and the alteration of the statistical properties of the data through benchmarking. A thorough demonstration is left for future research.

References

Arnaud, F. (2007). Calcul des contributions en volumes chaînés. Note aux utilisateurs, 23 novembre(n 47/DG75-G430/FA).

Berthier, J.-P. I. (2002). Réflexions sur les différentes notions de volume dans les comptes nationaux. Document de travail de l'INSEE, (Juin).

Bloem, A., Dippelsman, R., and Mæhle, N. (2001). Quarterly national accounts manual: concepts, data sources, and compilation. International Monetary Fund.

Denton, F. T. (1971). Adjustment of monthly or quarterly series to annual totals: an approach based on quadratic minimization. Journal of the American Statistical Association, 66(333):99–102.

Eurostat (2013). Handbook on quarterly national accounts. Eurostat European Commission, eurostat manuals and guidelines edition.

Schreyer, P. (2004). Chain index number formulae in the national accounts. In document presentat the 8th OECD-NBS Workshop on National Accounts, volume 6.

Appendix

Country	Ref year and volume concept	Chain-linking method
OECD Member Economies		
Australia	2011-12 Chained Vol. Est.	Quarter overlap
Austria	2010 Chained Vol. Est.	Annual overlap
Belgium	2011 Chained Vol. Est.	Annual overlap
Canada	2007 Chained Vol. Est.	Quarter overlap
Chile	2008 Chained Vol. Est.	Annual overlap
Czech Republic	2010 Chained Vol. Est.	Annual overlap
Denmark	2010 Chained Vol. Est.	Annual overlap
Estonia	2010 Chained Vol. Est.	Annual overlap
Finland	2000 Chained Vol. Est.	Annual overlap
France	2010 Chained Vol. Est.	Annual overlap
Germany	2010 Chained Vol. Est.	Annual overlap
Greece	2005 Chained Vol. Est.	Indirect method
Hungary	2005 Chained Vol. Est.	Annual overlap
Iceland	2005 Chained Vol. Est.	Annual overlap
Ireland	2012 Chained Vol. Est.	Annual overlap
Israel	2010 Chained Vol. Est.	
Italy	2010 Chained Vol. Est.	Annual overlap
Japan	2005 Chained Vol. Est.	Quarter overlap
Korea	2010 Chained Vol. Est.	Annual overlap
Luxembourg	2005 Chained Vol. Est.	Annual overlap
Mexico	2008 Fixed Ct.Pr.	-
Netherlands	2010 Chained Vol. Est.	Over the year (original values) Annual overlap (seas. adj. values)
New Zealand	1995-96 Chained Vol. Est.	Annual overlap
Norway	2011 Chained Vol. Est.	Annual overlap
Poland	2005 Chained Vol. Est.	Annual overlap
Portugal	2011 Chained Vol. Est.	Indirect method
Slovak Republic	2005 Chained Vol. Est.	Annual overlap
Slovenia	2000 Chained Vol. Est.	Annual overlap
Spain	2008 Chained Vol. Est.	Annual overlap
Sweden	2013 Chained Vol. Est.	Annual overlap
Switzerland	2005 Chained Vol. Est.	Annual overlap
Turkey	1998 Chained Vol. Est.	Indirect method
United Kingdom	2010 Chained Vol. Est.	Quarter overlap
United States	2009 Chained Vol. Est.	Quarter overlap
Non-OECD Member Economies		
Brazil	1995 Chained Vol. Est.	Annual overlap
Latvia	2010 Chained Vol. Est.	Annual overlap
Russian Federation	2004 Chained Vol. Est.	Annual overlap
Argentina	2004 Fixed Ct.Pr.	-
India	2004-05 Fixed Ct.Pr.	-
Indonesia	2005 Fixed Ct.Pr.	-
South Africa	2005 Fixed Ct.Pr.	-

Table 2: Concept of volumes and chain-linking methods in use in OECD and non-OECD countries
Source: OECD
http://stats.oecd.org/wbos/fileview2.aspx?IDFile=479ecd3c-28ec-4b04-bf6b-a6903ce31c55

Liste des documents de travail de la Direction des Études et Synthèses Économiques

G 9001 J. FAYOLLE et M. FLEURBAEY
Accumulation, profitabilité et endettement des entreprises

G 9002 H. ROUSSE
Détection et effets de la multicolinéarité dans les modèles linéaires ordinaires - Un prolongement de la réflexion de BELSLEY, KUH et WELSCH

G 9003 P. RALLE et J. TOUJAS-BERNATE
Indexation des salaires : la rupture de 1983

G 9004 D. GUELLEC et P. RALLE
Compétitivité, croissance et innovation de produit

G 9005 P. RALLE et J. TOUJAS-BERNATE
Les conséquences de la désindexation. Analyse dans une maquette prix-salaires

G 9101 Équipe AMADEUS
Le modèle AMADEUS - Première partie - Présentation générale

G 9102 J.L. BRILLET
Le modèle AMADEUS - Deuxième partie - Propriétés variantielles

G 9103 D. GUELLEC et P. RALLE
Endogenous growth and product innovation

G 9104 H. ROUSSE
Le modèle AMADEUS - Troisième partie - Le commerce extérieur et l'environnement international

G 9105 H. ROUSSE
Effets de demande et d'offre dans les résultats du commerce extérieur manufacturé de la France au cours des deux dernières décennies

G 9106 B. CREPON
Innovation, taille et concentration : causalités et dynamiques

G 9107 B. AMABLE et D. GUELLEC
Un panorama des théories de la croissance endogène

G 9108 M. GLAUDE et M. MOUTARDIER
Une évaluation du coût direct de l'enfant de 1979 à 1989

G 9109 P. RALLE et alii
France - Allemagne : performances économiques comparées

G 9110 J.L. BRILLET
Micro-DMS ***NON PARU***

G 9111 A. MAGNIER
Effets accélérateur et multiplicateur en France depuis 1970 : quelques résultats empiriques

G 9112 B. CREPON et G. DUREAU
Investissement en recherche-développement : analyse de causalités dans un modèle d'accélérateur généralisé

G 9113 J.L. BRILLET, H. ERKEL-ROUSSE, J. TOUJAS-BERNATE
"France-Allemagne Couplées" - Deux économies vues par une maquette macro-économétrique

G 9201 W.J. ADAMS, B. CREPON, D. ENCAOUA
Choix technologiques et stratégies de dissuasion d'entrée

G 9202 J. OLIVEIRA-MARTINS, J. TOUJAS-BERNATE
Macro-economic import functions with imperfect competition - An application to the E.C. Trade

G 9203 I. STAPIC
Les échanges internationaux de services de la France dans le cadre des négociations multilatérales du GATT
Juin 1992 (1ère version)
Novembre 1992 (version finale)

G 9204 P. SEVESTRE
L'économétrie sur données individuelles-temporelles. Une note introductive

G 9205 H. ERKEL-ROUSSE
Le commerce extérieur et l'environnement international dans le modèle AMADEUS (réestimation 1992)

G 9206 N. GREENAN et D. GUELLEC
Coordination within the firm and endogenous growth

G 9207 A. MAGNIER et J. TOUJAS-BERNATE
Technology and trade: empirical evidences for the major five industrialized countries

G 9208 B. CREPON, E. DUGUET, D. ENCAOUA et P. MOHNEN
Cooperative, non cooperative R & D and optimal patent life

G 9209 B. CREPON et E. DUGUET
Research and development, competition and innovation: an application of pseudo maximum likelihood methods to Poisson models with heterogeneity

G 9301 J. TOUJAS-BERNATE
Commerce international et concurrence imparfaite : développements récents et implications pour la politique commerciale

G 9302 Ch. CASES
Durées de chômage et comportements d'offre de travail : une revue de la littérature

G 9303 H. ERKEL-ROUSSE
Union économique et monétaire : le débat économique

G 9304 N. GREENAN - D. GUELLEC / G. BROUSSAUDIER - L. MIOTTI
Innovation organisationnelle, dynamisme technologique et performances des entreprises

G 9305 P. JAILLARD
Le traité de Maastricht : présentation juridique et historique

G 9306 J.L. BRILLET
Micro-DMS : présentation et propriétés

G 9307 J.L. BRILLET
Micro-DMS - variantes : les tableaux

G 9308 S. JACOBZONE
Les grands réseaux publics français dans une perspective européenne

G 9309 L. BLOCH - B. CŒURE
Profitabilité de l'investissement productif et transmission des chocs financiers

G 9310 J. BOURDIEU - B. COLIN-SEDILLOT
Les théories sur la structure optimale du capital : quelques points de repère

G 9311 J. BOURDIEU - B. COLIN-SEDILLOT
Les décisions de financement des entreprises françaises : une évaluation empirique des théories de la structure optimale du capital

G 9312 L. BLOCH - B. CŒURÉ
Q de Tobin marginal et transmission des chocs financiers

G 9313 Équipes Amadeus (INSEE), Banque de France, Métric (DP)
Présentation des propriétés des principaux modèles macroéconomiques du Service Public

G 9314 B. CREPON - E. DUGUET
Research & Development, competition and innovation

G 9315 B. DORMONT
Quelle est l'influence du coût du travail sur l'emploi ?

G 9316 D. BLANCHET - C. BROUSSE
Deux études sur l'âge de la retraite

G 9317 D. BLANCHET
Répartition du travail dans une population hétérogène : deux notes

G 9318 D. EYSSARTIER - N. PONTY
AMADEUS - an annual macro-economic model for the medium and long term

G 9319 G. CETTE - Ph. CUNÉO - D. EYSSARTIER - J. GAUTIÉ
Les effets sur l'emploi d'un abaissement du coût du travail des jeunes

G 9401 D. BLANCHET
Les structures par âge importent-elles ?

G 9402 J. GAUTIÉ
Le chômage des jeunes en France : problème de formation ou phénomène de file d'attente ? Quelques éléments du débat

G 9403 P. QUIRION
Les déchets en France : éléments statistiques et économiques

G 9404 D. LADIRAY - M. GRUN-REHOMME
Lissage par moyennes mobiles - Le problème des extrémités de série

G 9405 V. MAILLARD
Théorie et pratique de la correction des effets de jours ouvrables

G 9406 F. ROSENWALD
La décision d'investir

G 9407 S. JACOBZONE
Les apports de l'économie industrielle pour définir la stratégie économique de l'hôpital public

G 9408 L. BLOCH, J. BOURDIEU, B. COLIN-SEDILLOT, G. LONGUEVILLE
Du défaut de paiement au dépôt de bilan : les banquiers face aux PME en difficulté

G 9409 D. EYSSARTIER, P. MAIRE
Impacts macro-économiques de mesures d'aide au logement - quelques éléments d'évaluation

G 9410 F. ROSENWALD
Suivi conjoncturel de l'investissement

G 9411 C. DEFEUILLEY - Ph. QUIRION
Les déchets d'emballages ménagers : une analyse économique des politiques française et allemande

G 9412 J. BOURDIEU - B. CŒURÉ - B. COLIN-SEDILLOT
Investissement, incertitude et irréversibilité
Quelques développements récents de la théorie de l'investissement

G 9413 B. DORMONT - M. PAUCHET
L'évaluation de l'élasticité emploi-salaire dépend-elle des structures de qualification ?

G 9414 I. KABLA
Le Choix de breveter une invention

G 9501 J. BOURDIEU - B. CŒURÉ - B. SEDILLOT
Irreversible Investment and Uncertainty: When is there a Value of Waiting?

G 9502 L. BLOCH - B. CŒURÉ
Imperfections du marché du crédit, investissement des entreprises et cycle économique

G 9503 D. GOUX - E. MAURIN
Les transformations de la demande de travail par qualification en France
Une étude sur la période 1970-1993

G 9504 N. GREENAN
Technologie, changement organisationnel, qualifications et emploi : une étude empirique sur l'industrie manufacturière

G 9505 D. GOUX - E. MAURIN
Persistance des hiérarchies sectorielles de salaires: un réexamen sur données françaises

G 9505 Bis D. GOUX - E. MAURIN
Persistence of inter-industry wages differentials: a reexamination on matched worker-firm panel data

G 9506 S. JACOBZONE
Les liens entre RMI et chômage, une mise en perspective
NON PARU - article sorti dans Économie et Prévision n° 122 (1996) - pages 95 à 113

G 9507 G. CETTE - S. MAHFOUZ
Le partage primaire du revenu
Constat descriptif sur longue période

G 9601 Banque de France - CEPREMAP - Direction de la Prévision - Érasme - INSEE - OFCE
Structures et propriétés de cinq modèles macro-économiques français

G 9602 Rapport d'activité de la DESE de l'année 1995

G 9603 J. BOURDIEU - A. DRAZNIEKS
L'octroi de crédit aux PME : une analyse à partir d'informations bancaires

G 9604 A. TOPIOL-BENSAÏD
Les implantations japonaises en France

G 9605 P. GENIER - S. JACOBZONE
Comportements de prévention, consommation d'alcool et tabagie : peut-on parler d'une gestion globale du capital santé ?
Une modélisation microéconométrique empirique

G 9606 C. DOZ - F. LENGLART
Factor analysis and unobserved component models: an application to the study of French business surveys

G 9607 N. GREENAN - D. GUELLEC
La théorie coopérative de la firme

G 9608	N. GREENAN - D. GUELLEC Technological innovation and employment reallocation
G 9609	Ph. COUR - F. RUPPRECHT L'intégration asymétrique au sein du continent américain : un essai de modélisation
G 9610	S. DUCHENE - G. FORGEOT - A. JACQUOT Analyse des évolutions récentes de la productivité apparente du travail
G 9611	X. BONNET - S. MAHFOUZ The influence of different specifications of wages-prices spirals on the measure of the NAIRU: the case of France
G 9612	PH. COUR - E. DUBOIS, S. MAHFOUZ, J. PISANI-FERRY The cost of fiscal retrenchment revisited: how strong is the evidence?
G 9613	A. JACQUOT Les flexions des taux d'activité sont-elles seulement conjoncturelles ?
G 9614	ZHANG Yingxiang - SONG Xueqing Lexique macroéconomique Français-Chinois
G 9701	J.L. SCHNEIDER La taxe professionnelle : éléments de cadrage économique
G 9702	J.L. SCHNEIDER Transition et stabilité politique d'un système redistributif
G 9703	D. GOUX - E. MAURIN Train or Pay: Does it Reduce Inequalities to Encourage Firms to Train their Workers?
G 9704	P. GENIER Deux contributions sur dépendance et équité
G 9705	E. DUGUET - N. IUNG R & D Investment, Patent Life and Patent Value An Econometric Analysis at the Firm Level
G 9706	M. HOUDEBINE - A. TOPIOL-BENSAÏD Les entreprises internationales en France : une analyse à partir de données individuelles
G 9707	M. HOUDEBINE Polarisation des activités et spécialisation des départements en France
G 9708	E. DUGUET - N. GREENAN Le biais technologique : une analyse sur données individuelles
G 9709	J.L. BRILLET Analyzing a small French ECM Model
G 9710	J.L. BRILLET Formalizing the transition process: scenarios for capital accumulation
G 9711	G. FORGEOT - J. GAUTIÉ Insertion professionnelle des jeunes et processus de déclassement
G 9712	E. DUBOIS High Real Interest Rates: the Consequence of a Saving Investment Disequilibrium or of an insufficient Credibility of Monetary Authorities?
G 9713	Bilan des activités de la Direction des Études et Synthèses Économiques - 1996
G 9714	F. LEQUILLER Does the French Consumer Price Index Overstate Inflation?
G 9715	X. BONNET Peut-on mettre en évidence les rigidités à la baisse des salaires nominaux ? Une étude sur quelques grands pays de l'OCDE
G 9716	N. IUNG - F. RUPPRECHT Productivité de la recherche et rendements d'échelle dans le secteur pharmaceutique français
G 9717	E. DUGUET - I. KABLA Appropriation strategy and the motivations to use the patent system in France - An econometric analysis at the firm level
G 9718	L.P. PELÉ - P. RALLE Âge de la retraite : les aspects incitatifs du régime général
G 9719	ZHANG Yingxiang - SONG Xueqing Lexique macroéconomique français-chinois, chinois-français
G 9720	M. HOUDEBINE - J.L. SCHNEIDER Mesurer l'influence de la fiscalité sur la localisation des entreprises
G 9721	A. MOUROUGANE Crédibilité, indépendance et politique monétaire Une revue de la littérature
G 9722	P. AUGERAUD - L. BRIOT Les données comptables d'entreprises Le système intermédiaire d'entreprises Passage des données individuelles aux données sectorielles
G 9723	P. AUGERAUD - J.E. CHAPRON Using Business Accounts for Compiling National Accounts: the French Experience
G 9724	P. AUGERAUD Les comptes d'entreprise par activités - Le passage aux comptes - De la comptabilité d'entreprise à la comptabilité nationale - *A paraître*
G 9801	H. MICHAUDON - C. PRIGENT Présentation du modèle AMADEUS
G 9802	J. ACCARDO Une étude de comptabilité générationnelle pour la France en 1996
G 9803	X. BONNET - S. DUCHÊNE Apports et limites de la modélisation « Real Business Cycles »
G 9804	C. BARLET - C. DUGUET - D. ENCAOUA - J. PRADEL The Commercial Success of Innovations An econometric analysis at the firm level in French manufacturing
G 9805	P. CAHUC - Ch. GIANELLA - D. GOUX - A. ZILBERBERG Equalizing Wage Differences and Bargaining Power - Evidence form a Panel of French Firms
G 9806	J. ACCARDO - M. JLASSI La productivité globale des facteurs entre 1975 et 1996
G 9807	Bilan des activités de la Direction des Études et Synthèses Économiques - 1997

G 9808	A. MOUROUGANE Can a Conservative Governor Conduct an Accomodative Monetary Policy?
G 9809	X. BONNET - E. DUBOIS - L. FAUVET Asymétrie des inflations relatives et menus costs : tests sur l'inflation française
G 9810	E. DUGUET - N. IUNG Sales and Advertising with Spillovers at the firm level: Estimation of a Dynamic Structural Model on Panel Data
G 9811	J.P. BERTHIER Congestion urbaine : un modèle de trafic de pointe à courbe débit-vitesse et demande élastique
G 9812	C. PRIGENT La part des salaires dans la valeur ajoutée : une approche macroéconomique
G 9813	A.Th. AERTS L'évolution de la part des salaires dans la valeur ajoutée en France reflète-t-elle les évolutions individuelles sur la période 1979-1994 ?
G 9814	B. SALANIÉ Guide pratique des séries non-stationnaires
G 9901	S. DUCHÊNE - A. JACQUOT Une croissance plus riche en emplois depuis le début de la décennie ? Une analyse en comparaison internationale
G 9902	Ch. COLIN Modélisation des carrières dans Destinie
G 9903	Ch. COLIN Évolution de la dispersion des salaires : un essai de prospective par microsimulation
G 9904	B. CREPON - N. IUNG Innovation, emploi et performances
G 9905	B. CREPON - Ch. GIANELLA Wages inequalities in France 1969-1992 An application of quantile regression techniques
G 9906	C. BONNET - R. MAHIEU Microsimulation techniques applied to intergenerational transfers - Pensions in a dynamic framework: the case of France
G 9907	F. ROSENWALD L'impact des contraintes financières dans la décision d'investissement
G 9908	Bilan des activités de la DESE - 1998
G 9909	J.P. ZOYEM Contrat d'insertion et sortie du RMI Évaluation des effets d'une politique sociale
G 9910	Ch. COLIN - Fl. LEGROS - R. MAHIEU Bilans contributifs comparés des régimes de retraite du secteur privé et de la fonction publique
G 9911	G. LAROQUE - B. SALANIÉ Une décomposition du non-emploi en France
G 9912	B. SALANIÉ Une maquette analytique de long terme du marché du travail
G 9912 Bis	Ch. GIANELLA Une estimation de l'élasticité de l'emploi peu qualifié à son coût
G 9913	Division « Redistribution et Politiques Sociales » Le modèle de microsimulation dynamique DESTINIE
G 9914	E. DUGUET Macro-commandes SAS pour l'économétrie des panels et des variables qualitatives
G 9915	R. DUHAUTOIS Évolution des flux d'emplois en France entre 1990 et 1996 : une étude empirique à partir du fichier des bénéfices réels normaux (BRN)
G 9916	J.Y. FOURNIER Extraction du cycle des affaires : la méthode de Baxter et King
G 9917	B. CRÉPON - R. DESPLATZ - J. MAIRESSE Estimating price cost margins, scale economies and workers' bargaining power at the firm level
G 9918	Ch. GIANELLA - Ph. LAGARDE Productivity of hours in the aggregate production function: an evaluation on a panel of French firms from the manufacturing sector
G 9919	S. AUDRIC - P. GIVORD - C. PROST Évolution de l'emploi et des coûts par qualification entre 1982 et 1996
G 2000/01	R. MAHIEU Les déterminants des dépenses de santé : une approche macroéconomique
G 2000/02	C. ALLARD-PRIGENT - H. GUILMEAU - A. QUINET The real exchange rate as the relative price of nontrables in terms of tradables: theoretical investigation and empirical study on French data
G 2000/03	J.-Y. FOURNIER L'approximation du filtre passe-bande proposée par Christiano et Fitzgerald
G 2000/04	Bilan des activités de la DESE - 1999
G 2000/05	B. CREPON - F. ROSENWALD Investissement et contraintes de financement : le poids du cycle Une estimation sur données françaises
G 2000/06	A. FLIPO Les comportements matrimoniaux de fait
G 2000/07	R. MAHIEU - B. SÉDILLOT Microsimulations of the retirement decision: a supply side approach
G 2000/08	C. AUDENIS - C. PROST Déficit conjoncturel : une prise en compte des conjonctures passées
G 2000/09	R. MAHIEU - B. SÉDILLOT Équivalent patrimonial de la rente et souscription de retraite complémentaire
G 2000/10	R. DUHAUTOIS Ralentissement de l'investissement : petites ou grandes entreprises ? industrie ou tertiaire ?
G 2000/11	G. LAROQUE - B. SALANIÉ Temps partiel féminin et incitations financières à l'emploi
G2000/12	Ch. GIANELLA Local unemployment and wages
G2000/13	B. CREPON - Th. HECKEL - Informatisation en France : une évaluation à partir de données individuelles

- Computerization in France: an evaluation based on individual company data

G2001/01 F. LEQUILLER
- La nouvelle économie et la mesure de la croissance du PIB
- The new economy and the measure ment of GDP growth

G2001/02 S. AUDRIC
La reprise de la croissance de l'emploi profite-t-elle aussi aux non-diplômés ?

G2001/03 I. BRAUN-LEMAIRE
Évolution et répartition du surplus de productivité

G2001/04 A. BEAUDU - Th. HECKEL
Le canal du crédit fonctionne-t-il en Europe ? Une étude de l'hétérogénéité des comportements d'investissement à partir de données de bilan agrégées

G2001/05 C. AUDENIS - P. BISCOURP - N. FOURCADE - O. LOISEL
Testing the augmented Solow growth model: An empirical reassessment using panel data

G2001/06 R. MAHIEU - B. SÉDILLOT
Départ à la retraite, irréversibilité et incertitude

G2001/07 Bilan des activités de la DESE - 2000

G2001/08 J. Ph. GAUDEMET
Les dispositifs d'acquisition à titre facultatif d'annuités viagères de retraite

G2001/09 B. CRÉPON - Ch. GIANELLA
Fiscalité, coût d'usage du capital et demande de facteurs : une analyse sur données individuelles

G2001/10 B. CRÉPON - R. DESPLATZ
Évaluation des effets des dispositifs d'allégements de charges sociales sur les bas salaires

G2001/11 J.-Y. FOURNIER
Comparaison des salaires des secteurs public et privé

G2001/12 J.-P. BERTHIER - C. JAULENT R. CONVENEVOLE - S. PISANI
Une méthodologie de comparaison entre consommations intermédiaires de source fiscale et de comptabilité nationale

G2001/13 P. BISCOURP - Ch. GIANELLA
Substitution and complementarity between capital, skilled and less skilled workers: an analysis at the firm level in the French manufacturing industry

G2001/14 I. ROBERT-BOBEE
Modelling demographic behaviours in the French microsimulation model Destinie: An analysis of future change in completed fertility

G2001/15 J.-P. ZOYEM
Diagnostic sur la pauvreté et calendrier de revenus : le cas du "Panel européen des ménages »

G2001/16 J.-Y. FOURNIER - P. GIVORD
La réduction des taux d'activité aux âges extrêmes, une spécificité française ?

G2001/17 C. AUDENIS - P. BISCOURP - N. RIEDINGER
Existe-t-il une asymétrie dans la transmission du prix du brut aux prix des carburants ?

G2002/01 F. MAGNIEN - J.-L. TAVERNIER - D. THESMAR
Les statistiques internationales de PIB par habitant en standard de pouvoir d'achat : une analyse des résultats

G2002/02 Bilan des activités de la DESE - 2001

G2002/03 B. SÉDILLOT - E. WALRAET
La cessation d'activité au sein des couples : y a-t-il interdépendance des choix ?

G2002/04 G. BRILHAULT
- Rétropolation des séries de FBCF et calcul du capital fixe en SEC-95 dans les comptes nationaux français
- Retropolation of the investment series (GFCF) and estimation of fixed capital stocks on the ESA-95 basis for the French balance sheets

G2002/05 P. BISCOURP - B. CRÉPON - T. HECKEL - N. RIEDINGER
How do firms respond to cheaper computers? Microeconometric evidence for France based on a production function approach

G2002/06 C. AUDENIS - J. DEROYON - N. FOURCADE
L'impact des nouvelles technologies de l'information et de la communication sur l'économie française - un bouclage macro-économique

G2002/07 J. BARDAJI - B. SÉDILLOT - E. WALRAET
Évaluation de trois réformes du Régime Général d'assurance vieillesse à l'aide du modèle de microsimulation DESTINIE

G2002/08 J.-P. BERTHIER
Réflexions sur les différentes notions de volume dans les comptes nationaux : comptes aux prix d'une année fixe ou aux prix de l'année précédente, séries chaînées

G2002/09 F. HILD
Les soldes d'opinion résument-ils au mieux les réponses des entreprises aux enquêtes de conjoncture ?

G2002/10 I. ROBERT-BOBÉE
Les comportements démographiques dans le modèle de microsimulation Destinie - Une comparaison des estimations issues des enquêtes Jeunes et Carrières 1997 et Histoire Familiale 1999

G2002/11 J.-P. ZOYEM
La dynamique des bas revenus : une analyse des entrées-sorties de pauvreté

G2002/12 F. HILD
Prévisions d'inflation pour la France

G2002/13 M. LECLAIR
Réduction du temps de travail et tensions sur les facteurs de production

G2002/14 E. WALRAET - A. VINCENT
- Analyse de la redistribution intragénérationnelle dans le système de retraite des salariés du privé
- Une approche par microsimulation
- Intragenerational distributional analysis in the french private sector pension scheme - A microsimulation approach

G2002/15 P. CHONE - D. LE BLANC - I. ROBERT-BOBEE
Offre de travail féminine et garde des jeunes enfants

G2002/16 F. MAUREL - S. GREGOIR
Les indices de compétitivité des pays : interprétation et limites

G2003/01 N. RIEDINGER - E.HAUVY
Le coût de dépollution atmosphérique pour les entreprises françaises : Une estimation à partir de données individuelles

G2003/02 P. BISCOURP et F. KRAMARZ
Création d'emplois, destruction d'emplois et internationalisation des entreprises industrielles françaises : une analyse sur la période 1986-1992

G2003/03 Bilan des activités de la DESE - 2002

G2003/04 P.-O. BEFFY - J. DEROYON - N. FOURCADE - S. GREGOIR - N. LAÏB - B. MONFORT
Évolutions démographiques et croissance : une projection macro-économique à l'horizon 2020

G2003/05 P. AUBERT
La situation des salariés de plus de cinquante ans dans le secteur privé

G2003/06 P. AUBERT - B. CRÉPON
Age, salaire et productivité
La productivité des salariés décline-t-elle en fin de carrière ?

G2003/07 H. BARON - P.O. BEFFY - N. FOURCADE - R. MAHIEU
Le ralentissement de la productivité du travail au cours des années 1990

G2003/08 P.-O. BEFFY - B. MONFORT
Patrimoine des ménages, dynamique d'allocation et comportement de consommation

G2003/09 P. BISCOURP - N. FOURCADE
Peut-on mettre en évidence l'existence de rigidités à la baisse des salaires à partir de données individuelles ? Le cas de la France à la fin des années 90

G2003/10 M. LECLAIR - P. PETIT
Présence syndicale dans les firmes : quel impact sur les inégalités salariales entre les hommes et les femmes ?

G2003/11 P.-O. BEFFY - X. BONNET - M. DARRACQ-PARIES - B. MONFORT
MZE: a small macro-model for the euro area

G2004/01 P. AUBERT - M. LECLAIR
La compétitivité exprimée dans les enquêtes trimestrielles sur la situation et les perspectives dans l'industrie

G2004/02 M. DUÉE - C. REBILLARD
La dépendance des personnes âgées : une projection à long terme

G2004/03 S. RASPILLER - N. RIEDINGER
Régulation environnementale et choix de localisation des groupes français

G2004/04 A. NABOULET - S. RASPILLER
Les déterminants de la décision d'investir : une approche par les perceptions subjectives des firmes

G2004/05 N. RAGACHE
La déclaration des enfants par les couples non mariés est-elle fiscalement optimale ?

G2004/06 M. DUÉE
L'impact du chômage des parents sur le devenir scolaire des enfants

G2004/07 P. AUBERT - E. CAROLI - M. ROGER
New Technologies, Workplace Organisation and the Age Structure of the Workforce: Firm-Level Evidence

G2004/08 E. DUGUET - C. LELARGE
Les brevets accroissent-ils les incitations privées à innover ? Un examen microéconométrique

G2004/09 S. RASPILLER - P. SILLARD
Affiliating versus Subcontracting: the Case of Multinationals

G2004/10 J. BOISSINOT - C. L'ANGEVIN - B. MONFORT
Public Debt Sustainability: Some Results on the French Case

G2004/11 S. ANANIAN - P. AUBERT
Travailleurs âgés, nouvelles technologies et changements organisationnels : un réexamen à partir de l'enquête « REPONSE »

G2004/12 X. BONNET - H. PONCET
Structures de revenus et propensions différentes à consommer - Vers une équation de consommation des ménages plus robuste en prévision pour la France

G2004/13 C. PICART
Évaluer la rentabilité des sociétés non financières

G2004/14 J. BARDAJI - B. SÉDILLOT - E. WALRAET
Les retraites du secteur public : projections à l'horizon 2040 à l'aide du modèle de microsimulation DESTINIE

G2005/01 S. BUFFETEAU - P. GODEFROY
Conditions de départ en retraite selon l'âge de fin d'études : analyse prospective pour les générations 1945 à1974

G2005/02 C. AFSA - S. BUFFETEAU
L'évolution de l'activité féminine en France : une approche par pseudo-panel

G2005/03 P. AUBERT - P. SILLARD
Délocalisations et réductions d'effectifs dans l'industrie française

G2005/04 M. LECLAIR - S. ROUX
Mesure et utilisation des emplois instables dans les entreprises

G2005/05 C. L'ANGEVIN - S. SERRAVALLE
Performances à l'exportation de la France et de l'Allemagne - Une analyse par secteur et destination géographique

G2005/06 Bilan des activités de la Direction des Études et Synthèses Économiques - 2004

G2005/07 S. RASPILLER
La concurrence fiscale : principaux enseignements de l'analyse économique

G2005/08 C. L'ANGEVIN - N. LAÏB
Éducation et croissance en France et dans un panel de 21 pays de l'OCDE

G2005/09 N. FERRARI
Prévoir l'investissement des entreprises
Un indicateur des révisions dans l'enquête de conjoncture sur les investissements dans l'industrie.

G2005/10 P.-O. BEFFY - C. L'ANGEVIN
Chômage et boucle prix-salaires :
apport d'un modèle « qualifiés/peu qualifiés »

G2005/11 B. HEITZ
A two-states Markov-switching model of inflation in France and the USA: credible target VS inflation spiral

G2005/12 O. BIAU - H. ERKEL-ROUSSE - N. FERRARI
Réponses individuelles aux enquêtes de conjoncture et prévision macroéconomiques :
Exemple de la prévision de la production manufacturière

G2005/13 P. AUBERT - D. BLANCHET - D. BLAU
The labour market after age 50: some elements of a Franco-American comparison

G2005/14 D. BLANCHET - T. DEBRAND -
P. DOURGNON - P. POLLET
L'enquête SHARE : présentation et premiers résultats de l'édition française

G2005/15 M. DUÉE
La modélisation des comportements démographiques dans le modèle de microsimulation DESTINIE

G2005/16 H. RAOUI - S. ROUX
Étude de simulation sur la participation versée aux salariés par les entreprises

G2006/01 C. BONNET - S. BUFFETEAU - P. GODEFROY
Disparités de retraite de droit direct entre hommes et femmes : quelles évolutions ?

G2006/02 C. PICART
Les gazelles en France

G2006/03 P. AUBERT - B. CRÉPON -P. ZAMORA
Le rendement apparent de la formation continue dans les entreprises : effets sur la productivité et les salaires

G2006/04 J.-F. OUVRARD - R. RATHELOT
Demographic change and unemployment:
what do macroeconometric models predict?

G2006/05 D. BLANCHET - J.-F. OUVRARD
Indicateurs d'engagements implicites des systèmes de retraite : chiffrages, propriétés analytiques et réactions à des chocs démographiques types

G2006/06 G. BIAU - O. BIAU - L. ROUVIERE
Nonparametric Forecasting of the Manufacturing Output Growth with Firm-level Survey Data

G2006/07 C. AFSA - P. GIVORD
Le rôle des conditions de travail dans les absences pour maladie

G2006/08 P. SILLARD - C. L'ANGEVIN - S. SERRAVALLE
Performances comparées à l'exportation de la France et de ses principaux partenaires
Une analyse structurelle sur 12 ans

G2006/09 X. BOUTIN - S. QUANTIN
Une méthodologie d'évaluation comptable du coût du capital des entreprises françaises : 1984-2002

G2006/10 C. AFSA
L'estimation d'un coût implicite de la pénibilité du travail chez les travailleurs âgés

G2006/11 C. LELARGE
Les entreprises (industrielles) françaises sont-elles à la frontière technologique ?

G2006/12 O. BIAU - N. FERRARI
Théorie de l'opinion
Faut-il pondérer les réponses individuelles ?

G2006/13 A. KOUBI - S. ROUX
Une réinterprétation de la relation entre productivité et inégalités salariales dans les entreprises

G2006/14 R. RATHELOT - P. SILLARD
The impact of local taxes on plants location decision

G2006/15 L. GONZALEZ - C. PICART
Diversification, recentrage et poids des activités de support dans les groupes (1993-2000)

G2007/01 D. SRAER
Allègements de cotisations patronales et dynamique salariale

G2007/02 V. ALBOUY - L. LEQUIEN
Les rendements non monétaires de l'éducation : le cas de la santé

G2007/03 D. BLANCHET - T. DEBRAND
Aspiration à la retraite, santé et satisfaction au travail : une comparaison européenne

G2007/04 M. BARLET - L. CRUSSON
Quel impact des variations du prix du pétrole sur la croissance française ?

G2007/05 C. PICART
Flux d'emploi et de main-d'œuvre en France : un réexamen

G2007/06 V. ALBOUY - C. TAVAN
Massification et démocratisation de l'enseignement supérieur en France

G2007/07 T. LE BARBANCHON
The Changing response to oil price shocks in France: a DSGE type approach

G2007/08 T. CHANEY - D. SRAER - D. THESMAR
Collateral Value and Corporate Investment
Evidence from the French Real Estate Market

G2007/09 J. BOISSINOT
Consumption over the Life Cycle: Facts for France

G2007/10 C. AFSA
Interpréter les variables de satisfaction : l'exemple de la durée du travail

G2007/11 R. RATHELOT - P. SILLARD
Zones Franches Urbaines : quels effets sur l'emploi salarié et les créations d'établissements ?

G2007/12 V. ALBOUY - B. CRÉPON
Aléa moral en santé : une évaluation dans le cadre du modèle causal de Rubin

G2008/01 C. PICART
Les PME françaises : rentables mais peu dynamiques

G2008/02 P. BISCOURP - X. BOUTIN - T. VERGÉ
The Effects of Retail Regulations on Prices
Evidence form the Loi Galland

G2008/03 Y. BARBESOL - A. BRIANT
Économies d'agglomération et productivité des entreprises : estimation sur données individuelles françaises

G2008/04 D. BLANCHET - F. LE GALLO
Les projections démographiques : principaux mécanismes et retour sur l'expérience française

G2008/05 D. BLANCHET - F. TOUTLEMONDE
Évolutions démographiques et déformation du cycle de vie active : quelles relations ?

G2008/06 M. BARLET - D. BLANCHET - L. CRUSSON
Internationalisation et flux d'emplois : que dit une approche comptable ?

G2008/07 C. LELARGE - D. SRAER - D. THESMAR
Entrepreneurship and Credit Constraints - Evidence from a French Loan Guarantee Program

G2008/08 X. BOUTIN - L. JANIN
Are Prices Really Affected by Mergers?

G2008/09 M. BARLET - A. BRIANT - L. CRUSSON
Concentration géographique dans l'industrie manufacturière et dans les services en France : une approche par un indicateur en continu

G2008/10 M. BEFFY - É. COUDIN - R. RATHELOT
Who is confronted to insecure labor market histories? Some evidence based on the French labor market transition

G2008/11 M. ROGER - E. WALRAET
Social Security and Well-Being of the Elderly: the Case of France

G2008/12 C. AFSA
Analyser les composantes du bien-être et de son évolution
Une approche empirique sur données individuelles

G2008/13 M. BARLET - D. BLANCHET -
T. LE BARBANCHON
Microsimuler le marché du travail : un prototype

G2009/01 P.-A. PIONNIER
Le partage de la valeur ajoutée en France, 1949-2007

G2009/02 Laurent CLAVEL - Christelle MINODIER
A Monthly Indicator of the French Business Climate

G2009/03 H. ERKEL-ROUSSE - C. MINODIER
Do Business Tendency Surveys in Industry and Services Help in Forecasting GDP Growth?
A Real-Time Analysis on French Data

G2009/04 P. GIVORD - L. WILNER
Les contrats temporaires : trappe ou marchepied vers l'emploi stable ?

G2009/05 G. LALANNE - P.-A. PIONNIER - O. SIMON
Le partage des fruits de la croissance de 1950 à 2008 : une approche par les comptes de surplus

G2009/06 L. DAVEZIES - X. D'HAULTFOEUILLE
Faut-il pondérer ?… Ou l'éternelle question de l'économètre confronté à des données d'enquête

G2009/07 S. QUANTIN - S. RASPILLER - S. SERRAVALLE
Commerce intragroupe, fiscalité et prix de transferts : une analyse sur données françaises

G2009/08 M. CLERC - V. MARCUS
Élasticités-prix des consommations énergétiques des ménages

G2009/09 G. LALANNE - E. POULIQUEN - O. SIMON
Prix du pétrole et croissance potentielle à long terme

G2009/10 D. BLANCHET - J. LE CACHEUX - V. MARCUS
Adjusted net savings and other approaches to sustainability: some theoretical background

G2009/11 V. BELLAMY - G. CONSALES - M. FESSEAU -
S. LE LAIDIER - É. RAYNAUD
Une décomposition du compte des ménages de la comptabilité nationale par catégorie de ménage en 2003

G2009/12 J. BARDAJI - F. TALLET
Detecting Economic Regimes in France: a Qualitative Markov-Switching Indicator Using Mixed Frequency Data

G2009/13 R. AEBERHARDT - D. FOUGÈRE -
R. RATHELOT
Discrimination à l'embauche : comment exploiter les procédures de *testing* ?

G2009/14 Y. BARBESOL - P. GIVORD - S. QUANTIN
Partage de la valeur ajoutée, approche par données microéconomiques

G2009/15 I. BUONO - G. LALANNE
The Effect of the Uruguay round on the Intensive and Extensive Margins of Trade

G2010/01 C. MINODIER
Avantages comparés des séries des premières valeurs publiées et des séries des valeurs révisées - Un exercice de prévision en temps réel de la croissance trimestrielle du PIB en France

G2010/02 V. ALBOUY - L. DAVEZIES - T. DEBRAND
Health Expenditure Models: a Comparison of Five Specifications using Panel Data

G2010/03 C. KLEIN - O. SIMON
Le modèle MÉSANGE réestimé en base 2000
Tome 1 – Version avec volumes à prix constants

G2010/04 M.-É. CLERC - É. COUDIN
L'IPC, miroir de l'évolution du coût de la vie en France ? Ce qu'apporte l'analyse des courbes d'Engel

G2010/05 N. CECI-RENAUD - P.-A. CHEVALIER
Les seuils de 10, 20 et 50 salariés : impact sur la taille des entreprises françaises

G2010/06 R. AEBERHARDT - J. POUGET
National Origin Differences in Wages and Hierarchical Positions - Evidence on French Full-Time Male Workers from a matched Employer-Employee Dataset

G2010/07 S. BLASCO - P. GIVORD
Les trajectoires professionnelles en début de vie active : quel impact des contrats temporaires ?

G2010/08 P. GIVORD
Méthodes économétriques pour l'évaluation de politiques publiques

G2010/09 P.-Y. CABANNES - V. LAPÈGUE -
E. POULIQUEN - M. BEFFY - M. GAINI
Quelle croissance de moyen terme après la crise ?

G2010/10 I. BUONO - G. LALANNE
La réaction des entreprises françaises
à la baisse des tarifs douaniers étrangers

G2010/11 R. RATHELOT - P. SILLARD
L'apport des méthodes à noyaux pour mesurer la concentration géographique - Application à la concentration des immigrés en France de 1968 à 1999

G2010/12 M. BARATON - M. BEFFY - D. FOUGÈRE
Une évaluation de l'effet de la réforme de 2003 sur les départs en retraite - Le cas des enseignants du second degré public

G2010/13 D. BLANCHET - S. BUFFETEAU - E. CRENNER S. LE MINEZ
Le modèle de microsimulation Destinie 2 : principales caractéristiques et premiers résultats

G2010/14 D. BLANCHET - E. CRENNER
Le bloc retraites du modèle Destinie 2 :
guide de l'utilisateur

G2010/15 M. BARLET - L. CRUSSON - S. DUPUCH - F. PUECH
Des services échangés aux services échangeables : une application sur données françaises

G2010/16 M. BEFFY - T. KAMIONKA
Public-private wage gaps: is civil-servant human capital sector-specific?

G2010/17 P.-Y. CABANNES - H. ERKEL-ROUSSE - G. LALANNE - O. MONSO - E. POULIQUEN
Le modèle Mésange réestimé en base 2000
Tome 2 - Version avec volumes à prix chaînés

G2010/18 R. AEBERHARDT - L. DAVEZIES
Conditional Logit with one Binary Covariate: Link between the Static and Dynamic Cases

G2011/01 T. LE BARBANCHON - B. OURLIAC - O. SIMON
Les marchés du travail français et américain face aux chocs conjoncturels des années 1986 à 2007 : une modélisation DSGE

G2011/02 C. MARBOT
Une évaluation de la réduction d'impôt pour l'emploi de salariés à domicile

G2011/03 L. DAVEZIES
Modèles à effets fixes, à effets aléatoires, modèles mixtes ou multi-niveaux : propriétés et mises en œuvre des modélisations de l'hétérogénéité dans le cas de données groupées

G2011/04 M. ROGER - M. WASMER
Heterogeneity matters: labour productivity differentiated by age and skills

G2011/05 J.-C. BRICONGNE - J.-M. FOURNIER V. LAPÈGUE - O. MONSO
De la crise financière à la crise économique L'impact des perturbations financières de 2007 et 2008 sur la croissance de sept pays industrialisés

G2011/06 P. CHARNOZ - É. COUDIN - M. GAINI
Wage inequalities in France 1976-2004:
a quantile regression analysis

G2011/07 M. CLERC - M. GAINI - D. BLANCHET
Recommendations of the Stiglitz-Sen-Fitoussi Report: A few illustrations

G2011/08 M. BACHELET - M. BEFFY - D. BLANCHET
Projeter l'impact des réformes des retraites sur l'activité des 55 ans et plus : une comparaison de trois modèles

G2011/09 C. LOUVOT-RUNAVOT
L'évaluation de l'activité dissimulée des entreprises sur la base des contrôles fiscaux et son insertion dans les comptes nationaux

G2011/10 A. SCHREIBER - A. VICARD
La tertiarisation de l'économie française et le ralentissement de la productivité entre 1978 et 2008

G2011/11 M.-É. CLERC - O. MONSO - E. POULIQUEN
Les inégalités entre générations depuis le baby-boom

G2011/12 C. MARBOT - D. ROY
Évaluation de la transformation de la réduction d'impôt en crédit d'impôt pour l'emploi de salariés à domicile en 2007

G2011/13 P. GIVORD - R. RATHELOT - P. SILLARD
Place-based tax exemptions and displacement effects: An evaluation of the Zones Franches Urbaines program

G2011/14 X. D'HAULTFOEUILLE - P. GIVORD - X. BOUTIN
The Environmental Effect of Green Taxation: the Case of the French "Bonus/Malus"

G2011/15 M. BARLET - M. CLERC - M. GARNEO - V. LAPÈGUE - V. MARCUS
La nouvelle version du modèle MZE, modèle macroéconométrique pour la zone euro

G2011/16 R. AEBERHARDT - I. BUONO - H. FADINGER
Learning, Incomplete Contracts and Export Dynamics: theory and Evidence form French Firms

G2011/17 C. KERDRAIN - V. LAPÈGUE
Restrictive Fiscal Policies in Europe:
What are the Likely Effects?

G2012/01 P. GIVORD - S. QUANTIN - C. TREVIEN
A Long-Term Evaluation of the First Generation of the French Urban Enterprise Zones

G2012/02 N. CECI-RENAUD - V. COTTET
Politique salariale et performance des entreprises

G2012/03 P. FÉVRIER - L. WILNER
Do Consumers Correctly Expect Price Reductions? Testing Dynamic Behavior

G2012/04 M. GAINI - A. LEDUC - A. VICARD
School as a shelter? School leaving-age and the business cycle in France

G2012/05 M. GAINI - A. LEDUC - A. VICARD
A scarred generation? French evidence on young people entering into a tough labour market

G2012/06 P. AUBERT - M. BACHELET
Disparités de montant de pension et redistribution dans le système de retraite français

G2012/07 R. AEBERHARDT - P GIVORD - C. MARBOT
Spillover Effect of the Minimum Wage in France: An Unconditional Quantile Regression Approach

G2012/08 A. EIDELMAN - F. LANGUMIER - A. VICARD
Prélèvements obligatoires reposant sur les ménages : des canaux redistributifs différents en 1990 et 2010

G2012/09 O. BARGAIN - A. VICARD
Le RMI et son successeur le RSA découragent-ils certains jeunes de travailler ? Une analyse sur les jeunes autour de 25 ans

G2012/10 C. MARBOT - D. ROY
Projections du coût de l'APA et des caractéristiques de ses bénéficiaires à l'horizon 2040 à l'aide du modèle Destinie

G2012/11 A. MAUROUX
Le crédit d'impôt dédié au développement durable : une évaluation économétrique

G2012/12 V. COTTET - S. QUANTIN - V. RÉGNIER
Coût du travail et allègements de charges : une estimation au niveau établissement de 1996 à 2008

G2012/13 X. D'HAULTFOEUILLE - P. FÉVRIER - L. WILNER
Demand Estimation in the Presence of Revenue Management

G2012/14 D. BLANCHET - S. LE MINEZ
Joint macro/micro evaluations of accrued-to-date pension liabilities: an application to French reforms

G2013/01-F1301 T. DEROYON - A. MONTAUT - P-A PIONNIER
Utilisation rétrospective de l'enquête Emploi à une fréquence mensuelle : apport d'une modélisation espace-état

G2013/02-F1302 C. TREVIEN
Habiter en HLM : quel avantage monétaire et quel impact sur les conditions de logement ?

G2013/03 A. POISSONNIER
Temporal disaggregation of stock variables - The Chow-Lin method extended to dynamic models

G2013/04 P. GIVORD - C. MARBOT
Does the cost of child care affect female labor market participation? An evaluation of a French reform of childcare subsidies

G2013/05 G. LAME - M. LEQUIEN - P.-A. PIONNIER
Interpretation and limits of sustainability tests in public finance

G2013/06 C. BELLEGO - V. DORTET-BERNADET
La participation aux pôles de compétitivité : quelle incidence sur les dépenses de R&D et l'activité des PME et ETI ?

G2013/07 P.-Y. CABANNES - A. MONTAUT - P.-A. PIONNIER
Évaluer la productivité globale des facteurs en France : l'apport d'une mesure de la qualité du capital et du travail

G2013/08 R. AEBERHARDT - C. MARBOT
Evolution of Instability on the French Labour Market During the Last Thirty Years

G2013/09 J-B. BERNARD - G. CLÉAUD
Oil price: the nature of the shocks and the impact on the French economy

G2013/10 G. LAME
Was there a « Greenspan Conundrum » in the Euro area?

G2013/11 P. CHONÉ - F. EVAIN - L. WILNER - E. YILMAZ
Introducing activity-based payment in the hospital industry : Evidence from French data

G2013/12 C. GRISLAIN-LETRÉMY
Natural Disasters: Exposure and Underinsurance

G2013/13 P.-Y. CABANNES - V. COTTET - Y. DUBOIS - C. LELARGE - M. SICSIC
French Firms in the Face of the 2008/2009 Crisis

G2013/14 A. POISSONNIER - D. ROY
Households Satellite Account for France in 2010. Methodological issues on the assessment of domestic production

G2013/15 G. CLÉAUD - M. LEMOINE - P.-A. PIONNIER
Which size and evolution of the government expenditure multiplier in France (1980-2010)?

G2014/01 M. BACHELET - A. LEDUC - A. MARINO
Les biographies du modèle Destinie II : rebasage et projection

G2014/02 B. GARBINTI
L'achat de la résidence principale et la création d'entreprises sont-ils favorisés par les donations et héritages ?

G2014/03 N. CECI-RENAUD - P. CHARNOZ - M. GAINI
Évolution de la volatilité des revenus salariaux du secteur privé en France depuis 1968

G2014/04 P. AUBERT
Modalités d'application des réformes des retraites et prévisibilité du montant de pension

G2014/05 C. GRISLAIN-LETRÉMY - A. KATOSSKY
The Impact of Hazardous Industrial Facilities on Housing Prices: A Comparison of Parametric and Semiparametric Hedonic Price Models

G2014//06 J.-M. DAUSSIN-BENICHOU - A. MAUROUX
Turning the heat up. How sensitive are households to fiscal incentives on energy efficiency investments?

G2014/07 C. LABONNE - G. LAMÉ
Credit Growth and Capital Requirements: Binding or Not?

G2014/08 C. GRISLAIN-LETRÉMY et C. TREVIEN
The Impact of Housing Subsidies on the Rental Sector: the French Example

G2014 09 M. LEQUIEN et A. MONTAUT
Croissance potentielle en France et en zone euro : un tour d'horizon des méthodes d'estimation

G2014/10 B. GARBINTI - P. LAMARCHE
Les hauts revenus épargnent-ils davantage ?

G2014/11 D. AUDENAERT - J. BARDAJI - R. LARDEUX - M. ORAND - M. SICSIC
Wage Resilience in France since the Great Recession

G2014/12 F. ARNAUD - J. BOUSSARD - A. POISSONNIER - H. SOUAL
Computing additive contributions to growth and other issues for chain-linked quarterly aggregates