



HAL
open science

GDP, an insufficient indicator for estimating the power of a country and GDP per capita, an insufficient indicator for estimating the well-being of citizens.

Jacques Fontanel

► To cite this version:

Jacques Fontanel. GDP, an insufficient indicator for estimating the power of a country and GDP per capita, an insufficient indicator for estimating the well-being of citizens.. 2020. hal-02986071

HAL Id: hal-02986071

<https://hal.univ-grenoble-alpes.fr/hal-02986071>

Preprint submitted on 2 Nov 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

GDP, an insufficient indicator for estimating the power of a country and GDP per capita, an insufficient indicator for estimating the well-being of citizens. Pax Economica

Jacques Fontanel
Conference
ILERI, 3 march 2020
English version
Pré-publication
2020

GDP is the most widely used economic indicator. It is a basis for classifying states in their obsession of development and power. The more the environmental and societal issues become worrying, the more the current indicator systems, especially GDP, become unsuitable. Short run economism neglects the scarcity of clean air but also democratic freedoms, citizen solidarity or cultural life. It is urgent to construct sets of indicators adapted to the questions posed for the understanding of the international relations and comparisons.

Le PIB est l'indicateur économique le plus largement utilisé. Il sert de base pour classer les États dans leur obsession du développement et du pouvoir. Plus les questions environnementales et sociétales deviennent préoccupantes, plus les systèmes d'indicateurs actuels, en particulier le PIB, deviennent inadaptés. L'économisme de court terme néglige la rareté de l'air pur mais aussi les libertés démocratiques, la solidarité citoyenne ou la vie culturelle. Il est urgent de construire des ensembles d'indicateurs adaptés aux questions posées pour la compréhension des relations et des comparaisons internationales.

GDP, State Power, Well-Being
PIB, Puissance des Etats, Bien-être

GDP is the representative aggregate of all goods and services producing activities of economic agents resident in a country. It aims to quantify the total value of wealth production created by economic agents. It is a summary measure of the total annual value added of all economic agents resident in a country, based on information provided by enterprises, banks and government. It can be calculated in several ways, either unadjusted (nominal or value GDP) or adjusted for inflation (real or volume GDP). The annual change in GDP expresses the economic growth rate of a country. It has, however, become an important instrument for analysing international relations, with States making its estimate the essential marker of their economic policy. However, the calculation and international comparison of GDP poses many problems and the use of GDP change alone is no longer acceptable (Coyle, 2014).

The limitations of GDP as an indicator of the productive power and well-being of national populations

The GDP highlights the productive capacity of a national economy, without any value judgement on the interest of the goods and services produced, on the excessive exploitation of the natural heritage (air, water, forests, raw materials, energy) or on the quality of the well-being of the Nation and its inhabitants. It ignores many economic activities, such as self-production, self-consumption, voluntary work, altruistic activities (free software, donations), barter (exchanges of books or time) or actions of the solidarity economy, which are nevertheless important for social and individual development. Conversely, the estimation of illegal activities is beginning to be introduced into the calculation in the same way as the underground economy in emerging developing countries (Bensahel, Fontanel, 2007). The real value of a country's production activity is then underestimated, as is the estimation of consumer purchasing power in relation to their income. GDP does not take into account the quality of the operations it considers productive, nor the conditions under which they are carried out (slavery or domination effects, for example). It simply measures activities that are invoiced, whether positive or negative.

- Collective services (public health, education or justice) are estimated on the basis of the public expenditure allocated to their operation. In many countries, some of these services are market-based and more expensive (e.g. access to university, health care). As the private health system is more expensive than the public service for an equivalent quality, the level of

privatization inflates or reduces GDP, without the services rendered being significantly different.

- Estimates of GDP are often based on statistical conventions, on the basis of statements made by economic agents that are therefore assumed to be true. In addition, states (such as China) may cheat on the figures provided, as we have seen in the case of military expenditure (Fontanel, 1982). Companies are also involved. They use the interstices of globalization to provide the statistical information that enables them to maximize their profits. The globalization of production chains significantly changes the information on the territoriality of real value added. The real prices of transfers of goods and services within multinationals are kept secret, protected by the famous "business secret". It is then difficult to verify the added value relative to a national location whose activity provides only one element of the production chain. The fragmentation of production has allowed the development of international networks of production and exchange which transform the realisation of national comparative advantages. In this context, enterprises are seeking to improve their capacity to integrate into value chains by optimizing their tax and social security systems by bringing maximum value added to the most attractive countries, the lowest tax payers, or the best performers in terms of aid and subsidies. Tax avoidance and optimisation also lead to real changes in the figures (Fontanel, 2016; Saez & Zucman, 2020), notably thanks to the very heterogeneous taxation of property rights. However, when international organisations provide information on the GDP of member countries, they simply transcribe the figures provided nationally, without any control by an authority.

International comparisons raise the problem of a homogeneous definition of GDP and the application of exchange rates. Several statistical instruments have been put in place to limit this random effect, which is sometimes based simply on speculative short-term activity. In particular, the purchasing power parity system consists of constituting a basket of significant products, valuing it in the currencies of each zone and thus determining the "true" value of the exchange rate, outside the monetary and financial system. But this procedure is not without flaws, particularly in the definition of the basket, which, depending on consumption and investment habits, are significantly different from country to country (Donsimoni, Fontanel, 2019).

Last but not least, GDP is indifferent to the social and human conditions of the mode of production, to the reduction of the patrimony concerning arable land, to the impoverishment of raw or energy materials in the subsoil, to the degradation or improvement of air quality, to the progress or decline in healthy life expectancy, to the well-being felt by citizens, to the availability of leisure, to the level of internal and external

security, of education or, again, to inequalities of income and patrimony. It does not differentiate between production and nuisance. Among the goods produced, there are "Bads" (nuisance or inconvenience), whose definitions remain complex and conventional. Shale gas and oil are banned from production in some countries while others, notably the United States, produce and sell them for export. GDP makes no reference to the conservation of the natural heritage, which is assumed to be constant and free of charge. In the context of sustainable development, GDP neglects the consumption of natural capital, the value of which, although difficult to calculate, is nevertheless undeniable in view of its relative scarcity in time and space. The destruction of tropical forests in order to produce plants for agrofuels increases the national GDP of the countries concerned, without any regard for the ecological and humanitarian disaster it represents in the long term. It positively accounts for the highly polluting production that promotes diseases such as cancer. It then accounts for three activities: the wealth produced in the market world by the initial productive activity, the commodification of anti-polluting measures and the increase in health spending. GDP will also increase in the event of an attack, natural disaster, car accident or massive pollution.

The "perverse effects" of GDP and its declinations are reinforced by the use that is made of it, since it invites itself well beyond its normal scope of information. The indicator itself is not directly at fault, it is the use that is made of it that is so blatantly, obviously, constantly and permanently flawed that it is difficult not to think that these misuses are more than mere errors or easy mistakes, "deceptions".

With regard to GDP, a sign of economic power and might, the main excess is the image of the G2, the idea, starting from the observation that China's GDP, especially in terms of PPP, is on a par with that of the United States, that Washington now has an alter ego. However, Beijing is still far from the American level whether it is an economic power or, even more so, a global power. One need only recall the global importance of the dollar, the innovative strength of the American economy and the incomparable military power of the United States (Fontanel, 2020). Similarly, the presentation of unified Germany as the European superpower on the basis of the size of its GDP has had an undeniable inhibiting effect on the development of the European Union and on the functioning of the Eurozone.

The misuse of GDP as a sign of performance and dynamism is reinforced by the assertion that there is a correlation between the level of GDP and unemployment and the need for a certain percentage of growth (at least 2%) in order to reduce unemployment. However, GDP depends on many factors, particularly the social laws that accompany the labour

market, but also on the availability of raw materials and energy on the territory of the States. Their decrease or increase is not always due to the dynamism of the country; it is due to the market situation, speculation, strong or weak demand, but also to the organisation of negotiations between countries exporting and importing natural resources. GDP is not a sufficiently reliable and powerful indicator of a country's economic strength, as it does not give any indication of the content and development of the value of natural assets, the stock of economic wealth, the size of national public and private debt and the overall educational, cultural and health (it is only human wealth) potential of a country. Perhaps the greatest misuse of GDP is in the area of welfare (OECD, 2001). As we have seen, a high and rapidly growing GDP can perfectly well coexist with deplorable living conditions, very high pollution and very unequal income distribution. The "median" wealth in the Global Wealth Data Book (Credit Suisse, 2019) and certain indicators of the human development index (life expectancy, education level), despite their own shortcomings, are more relevant. The use of a satisfaction questionnaire is a useful complement to the assessment of well-being, which is inevitably highly subjective and fluctuates according to the heterogeneity of national and international (regional and global) contexts.

GDP provides only a rough estimate of the national production capacity actually exercised by a country during a given year. Given the number and importance of its technical and conceptual limitations, it should be used only sparingly and cautiously. The announcement of its reduction or even disappearance creates a sense of instability and anxiety. This is the case during the Covid-19 period. However, many other values could also be put forward, such as air quality, social solidarity and political reflection on the living conditions of the poorest. The pandemic is undoubtedly also a warning about the dangers of productivist policies that neglect human values, develop increasingly unbearable inequalities and neglect the notion of well-being. Similarly, military power cannot exist without sufficient economic strength, but too much military spending also reduces the economic potential of a nation and thus, in the absence of war, the capacity of a state in the future to continue this effort (Fontanel, 2010). The collapse of the USSR is a recent example of this.

Other indicators of the comparative power of states

Economists and national accountants, aware that GDP and growth do not always give the necessary signals to prevent major economic, social and political crises in time, have sought to construct and promote other indices as a counterweight to the omnipotence of GDP and GDP per capita. They

have developed indicators that constitute alternative compasses, allowing "civil society" to define, democratically, what a better society is for today and tomorrow, and citizens to express themselves on their vital objectives.

Despite common use, power and wealth remain vague and undeveloped notions (Coulomb, Fontanel, 2006). The economic, cultural, military, political and civilisational sectors are essential elements of power. It is undoubtedly preferable to reason in terms of capabilities in all these areas, but experts and the media show little interest in them. Reflection on the concept of power in military matters is limited to an analysis of military expenditure and the number of significant, often heterogeneous, armaments. In the economy, a large foreign trade surplus is often considered to be "the" sign of power, whereas it can also be a major vulnerability as soon as protectionism and economic crisis strike. Similar considerations can be made about wealth, efficiency, and well-being.

In the end, it can be seen that the very exaggerated share of GDP as an explanatory factor for the power of States is largely due to the weakness of scientific analysis of international relations. This is the result of the absence of multidisciplinary analyses, which are often poorly perceived and valued in academic circles. Linked to the market order, it finally benefits from the dynamics of globalisation and the support of those who carry it or have carried it. Washington and Beijing gain from an explanation of the world centred on GDP. Exiting from the GDP at all is likely to be difficult and time-consuming. We must denounce the GDP syllogism - a high and rapidly growing GDP is a sign of performance, wealth, increasing well-being and the growing power of the State. More complex approaches could lead to more nuanced results closer to reality. It should also be possible to take into account not only economic values, but also military strength, scientific innovation, population size, cultural influence, political footprint or diplomatic competence. Thus, military expenditure as a percentage of GDP is an interesting indicator for expressing the ability of a country or group of countries to maintain or develop the national defence military effort, but it is only a partial component of military power. Deterrence, especially nuclear deterrence, and force projection capabilities are also fundamental ingredients of a country's military power and should not be neglected. Moreover, the strategies proposed by the government for the defence of the country can make more or less optimal use of the sums made available to it to ensure the real defence of a country. France's spending on the Maginot Line was of no use in this conflict because it was bypassed. Thus, this major expenditure was not used for the defence of the country when it was needed.

The gap between the United States and China, which is small if we judge only by GDP calculated on the basis of constant exchange rates, increases as

soon as a broader notion of economic power is introduced, including the importance of the dollar, military forces and more generally "soft power". Indicators of international relations do not value the power of the European Union (Guilhaudis, 2017). This can be explained, in part, by the relative fragility of its governance and its relative dependence in terms of collective security. Conversely, China does not yet have a second strike capability, unlike the United Kingdom and France. A country's security is at least as important an indicator as GDP in defining its power (Aben, Fontanel, 2018).

It is therefore necessary to develop other significant indices. William Nordhaus and James Tobin (1973), constructors of the first monetary well-being indicator inspired by GDP, proposed the introduction of two new concepts, 'regrettable goods' (goods that create negative amenities) and 'defensive expenditures' (paid activities whose sole purpose is to repair the damage caused by other productive activities). The aim was thus to restore a sense of well-being threatened by the realization of certain market activities that generate 'regrettable goods'. To do this, they propose to consider defensive or reparative expenditure as intermediate expenditure and not as a final product to be valued in GDP. This conception, which is a priori very relevant, has not, however, been the subject of more detailed statistical studies, no doubt for technical reasons, but also because the conception of 'regrettable goods' or 'defensive expenditure' is not always immediately perceived in this way, their negative effects being expressed in particular conditions of concentration or with a more or less significant delay in perception or scientific understanding.

Osberg and Sharp (2002) have developed a well-being index (WBI) that proposes to estimate several variables such as current consumption flows, wealth stocks (tangible goods, durable consumer goods, accumulation of human and social capital, environmental costs) and income distribution (inequality, poverty, economic and social precariousness). This calculation carried out on 6 countries (United States, United Kingdom, Canada, Australia, Norway and Sweden) revealed distortions between the GDP per capita of these countries and the statistical perception of the well-being of their citizens (Sharpe, Méda, Jany-Catrice, Perret, 2003). For example, in 20 years, while GDP had risen sharply in national currency units, the individual and collective well-being of the British had stagnated (Sharpe, Méda, Jany-Catrice, Perret, 2003). For example, in 20 years, while GDP had increased sharply in national currency units, the individual and collective well-being of the British had stagnated, due to growing social inequalities.

National accountants propose the calculation of indicators of well-being through satellite accounts, but their media and political impact remains too weak. The Human Development Indicator proposed by Amartya Sen and

the UNDP partly overlaps with the question of well-being. It gives interesting results, but is sometimes difficult to interpret. It calculates human health and longevity (measured by life expectancy at birth), knowledge or level of education (average length of schooling or ability to make decisions), standard of living (gross per capita income in purchasing power parity) and the satisfaction of essential material needs such as access to healthy food, drinking water, decent housing, good hygiene and medical care. However, these indicators do not always lend themselves to indisputable interpretation. If a country has more hospital beds, is this a sign of a better consideration of the necessary collective care or is it due to the development of new diseases, especially psychiatric ones? The available indicators are not always sufficiently substantiated. Developing countries have a slightly increasing HDI, which shows a better integration into the world economy between 1990 and 2016, with the exception of several African countries.

The United Nations Committee of Experts on Environmental-Economic Accounting (UNCEE), in a very interesting approach because it is more global, is working to define an indicator that takes into account the effects on the environment. This involves calculating a green Gross Domestic Product and building a System of Environmental-Economic Accounting (SEEA) an international standard and promoting its implementation in countries (United Nations, 2016).

The Economic, Social and Environmental Council and France Stratégie (CESE, France Stratégie, 2015) have proposed the presentation of ten indicators in addition to GDP to serve as a support annexed to the finance bill. The choices are not indisputable, but relevant and comprehensible indicators must be selected to inform public policy choices, particularly in terms of "sustainability".

Income inequality is not only an economic problem, but also a political one, for while it also contributes to the definition of collective well-being, it also fuels demands and frustrations. Inequality has a price that of wasted resources in the case of very rich groups whose wealth is no longer a priority. It is therefore a question of implementing an efficiency indicator concerning the potential for political-social "sustainability" of a given situation. A poverty and precariousness rate could also be introduced.

The integration of environmental issues into the measurement of progress is necessary. The carbon footprint measures the amount of greenhouse gases needed to meet citizens' annual needs. The rate of waste recycling tends to lower the carbon footprint and highlights the importance of collective responsibility in refusing to waste natural resources. Finally, the evolution of diversity is highlighted as a criterion, based on the abundance of birds at the end of the food chain.

Table 1 - Summary of the 10 complementary indicators to GDP proposed by the EESC and France Stratégie (EESC, France Stratégie, 2015).

Income inequalities	Ratio of the mass of income held by the richest 10% and the poorest 10% of the population
Climate-energy	Carbon footprint
Resource management	Waste recycling rate
Biodiversity	Bird abundance index
Labour-employment	Employment rate of the labour force (15 - 64 years)
Investment	Physical and intangible productive assets as % of Net Domestic Product
Financial capital	Debt of the various non-financial economic agents (general government, enterprises, households) in relation to GDP
Education	Graduation rate from tertiary education among 25-34 year olds
Health	Healthy life expectancy at birth
Well-Being	Life satisfaction (SRCV/SILC survey)

With regard to employment, a more detailed analysis of job insecurity and "zero hour" contracts should be undertaken, along with the level of social protection for workers and their compensation in the event of unemployment. The differences between States are significant and must be highlighted in order to analyse the comparative situations of citizens.

Investment measures the accumulation of the means of production transmitted from one generation to the next. It is an essential element in the development of the national economy, although its content should also be more finely analysed.

The emphasis on public debt (public administration debt) is probably not always to be favoured, but private debt should also be taken into account (Banque de France, 2015). Not all debt is a burden for a country, it can also be the expression of strong investments towards the future, which will benefit the young population, or of a collective struggle to immediately combat situations of conflict, war or pandemic (Brunat, Fontanel, 2020).

The quality of the education system also measures a country's level of progress. The choice of the rate of higher education graduates among the 25-34 age group reflects an 'elitist' perception of the indicator. Literacy or reading ability rates of pupils at the age of 11 would probably be equally relevant indicators. Similarly, the number of researchers and their capacity

to produce scientific discoveries or commercial patents shows a real consideration of human potential in favour of the national economy and technological advances. However, one may legitimately question both the nature of higher education training and its adequacy (whether sought or not) with the jobs of today or tomorrow. The OECD uses the PISA indicators.

Healthy life expectancy (without activity limitation and without disabilities) provides important information, which shows both a consideration of health needs and a capacity to protect the bodies and minds of citizens.

Finally, the indicator of satisfaction with one's life is subjective, and changes according to periods of national or international stress or calm. This indicator can change rapidly according to factors such as terrorism, the influence of the media, the age pyramid, precariousness, but also educational or religious values.

This analysis is a good starting point. However, it seems to us that other elements should also be taken into account, such as inequalities of wealth and income, but also the country's openness to the outside world, its degree of dependence on international trade and technological development, the quality of its diplomatic relations or the strength of its common security alliances (Smith, Fontanel, 2008).

Conclusions

National accountants are well aware of the limits of their instrument; they ask to use the concept of GDP only to the best advantage. But they are clearly not being listened to.

National accountants are well aware of the limits of their instrument; they ask to use the concept of GDP only to the best advantage. But they are clearly not being listened to.

Yet the single or dominant reference to GDP is dangerous. The very idea of economic development, such as indefinite growth and "catching up" for developing countries, is called into question with the concept of "sustainable" development. American-style" economic growth, which consumes too many raw materials and produce too much pollution, cannot be an objective for other national economies, especially if one takes into account the rapid emergence of new rarities. The more worrying ecological and societal issues become, the more we realise that our current systems of indicators, especially GDP, are counterproductive. What is the point of organising Earth Summits, climate and biodiversity conferences, if economic actors, on a daily basis, are encouraged to move towards an unsustainable form of growth?

It is unquestionably important and urgent to move away from GDP imperialism, but we are far from having achieved this. It is also of primary

importance to account for the minuses, the "Bads" and their costs, such as the definitive disappearance of certain raw materials, rare earths, the influence of pollution on those concerned and, in international relations, their effects on neighbouring countries. Countries defend themselves to develop or maintain their political and economic power. In the history of economic thought, mercantilists had put the national economy at the service of the Prince's power. Today, while most countries belong to the World Trade Organization, which advocates and defends free trade and combats protectionism, the struggle between the great powers also involves actions that mercantilist thinking would not have denied (Fontanel, Hébert, Samson, 2008).

But probably the most important thing is, contrary to what is currently being done, to try to construct indicators or sets of indicators adapted to the understanding of a given issue - global power, economic power, well-being, security - and not to 'make talk' and transform into false oracles, indicators whose limits and defects are obvious.

References and Bibliography

Aben, J., Fontanel, J. (2018), Military expenditure as a proxy for State's power, *Defence and Peace Economics*

Banque de France, Taux d'endettement des agents non financiers. Comparaisons internationales, *Stat Info*, 2^e Trimestre 2015. https://www.banque-france.fr/uploads/tx_bdfstatistiquescalendrier/2015-T2-stat-info-taux-d-endettement-des-anf-comparaisons-internationales.pdf

Bensahel, L., Fontanel, J. (2006). *L'économie souterraine : L'exemple de la Russie*. Editions L'Harmattan.

Brunat, E., Fontanel, J. (2020), La science économique comme idéologie. La science de gestion comme viatique de l'actionnaire, *Marchés et organisation*.

CESE, France Stratégie (2015), *Le CESE et France Stratégie proposent 10 indicateurs phares complémentaires au PIB*. <http://www.lecese.fr/content/lecese-et-france-strat-gie-proposent-10-indicateurs-phares-compl-mentaires-au-pib>

[Coulomb, F., Fontanel, J. \(2006\), Mondialisation, guerre économique et souveraineté nationale, in *Question politique en économie internationale*, La Découverte, Paris](#)

Crédit Suisse (2019), *The Global wealth Report*, credit-suisse.com/about-us/en/reports-research/global-wealth-report.html

Coyle, D. (2014) *Is GDP still useful?*, *Better Life Index*, May 16, <http://www.oecdbetterlifeindex.org/blog/is-gdp-still-useful.htm>

[Donsimoni, M., Fontanel, J. \(2019\)](#), Les ambiguïtés de la mesure de la puissance économique des Etats par les parités de pouvoir d'achat, *Annuaire Français des Relations Internationales*, AFRI, 2019, Paris.

Fontanel, J., Hébert, J-P, Sanson, I. (2008), The birth of the Political Economy or the Economy in the heart of Politics : Mercantilism, *Defence and Peace Economics*, 19.31. 2

Fontanel, J. (2010), Concept élargi de la sécurité économique, in *Politique Economique de la Sécurité Internationale*, Ed. Jacques Fontanel, L'Harmattan, Paris.

Fontanel, J. (2010), *Politique Economique de la Sécurité internationale*, L'Harmattan, Paris.

Fontanel, J. (2016), *Paradis fiscaux, pays filous. La fuite organisée des impôts vers les pays complices*, l'Harmattan, Paris.

[Guilhaudis, J.F., Fontanel, J \(2017\)](#), [Le PIB, Indicateur, Totem et mauvais marqueur](#), in [Guilhaudis, J.F. \(2017\)](#), *Relations internationales contemporaines*, 4^e édition augmentée, Lexis Nexis, Paris.

Guilhaudis, J.F. (2017), *Relations internationales contemporaines*, 4^e édition augmentée, Lexis Nexis, Paris.

Guilhaudis, J-F., Fontanel, J. (2019), Les effets pervers de l'usage du PIB pour la décision politique et les relations internationales. Comment en sortir ? *Annuaire Français des Relations Internationales*, AFRI 2019.

Fontanel, J. (2020), *La Chine face à la puissance des Etats-Unis, le conflit du leadership mondial*, Hal- 02900373. CESICE, Grenoble.

Fontanel, J. (2020b), La troisième révolution industrielle, une question de survie ? *PSEI, Paix et Sécurité européenne et internationale*, Nice.

Nations Unies (2016), *Cadre central du Système de Comptabilité économique et environnementale 2012*,

https://unstats.un.org/unsd/envaccounting/seearev/cf_trans/seea_cf_final_fr.pdf

Nordhaus W., Tobin J., « Is Growth Obsolete ? » in , *The Measurement of Economic and Social Performance, Studies in Income and Wealth*, National Bureau of Economic Research, vol.38, 1973.

OCDE (2001), *Du bien-être des nations, le rôle du capital humain et social*. Paris. 2001.

Osberg, L. & et A.Sharpe (2002), [« Une évaluation de l'indicateur de bien-être économique dans les pays de l'OCDE »](#), Séminaire de la DARES, 15 Octobre 2002.

Saez, E., Zucman, G. (2020) *Le triomphe de l'injustice*, Le Seuil, Paris.

Sharpe A., Méda. D, Jany-Catrice F. et Perret B (2003), Débat sur l'indice de bien-être économique, *Travail et Emploi*, n° 93, Janvier 2003.

Smith, R., Fontanel, J. (2008), International security, defence economics and the power of Nations, in Fontanel, J & Chatterji M (Ed.), *War, Peace and Security*, Emerald Group Publishing. UK.