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Economic growth and productivity in French Polynesia: a long-term analysis

Vincent Dropsy* and Christian Montet*

Abstract – After a very rapid economic boom in the sixties, due to the installation of the Pacific Testing Centre and the construction of airports in Tahiti and its islands, French Polynesia experienced an almost continuous decline in its growth during the next four decades, before plunging into an economic depression since 2009. This research analyses the factors of growth (labour, capital intensity, human capital, total factor productivity) in French Polynesia over the period 1960-2006, after reconstituting long and consistent series of the variables studied and compares them with metropolitan France (including overseas Departments). Total factor productivity has been a negative contributor to growth over 1988-1996 and since 2001. These long episodes of low total factor productivity could be indicative of the existence of significant structural barriers to growth, such as high costs typical of small island economies, as well as misallocation of resources due to a lack of entrepreneurial dynamism and an excess of protectionism.

JEL Classification : O47, O56
Keywords: GDP, growth, productivity, French Polynesia

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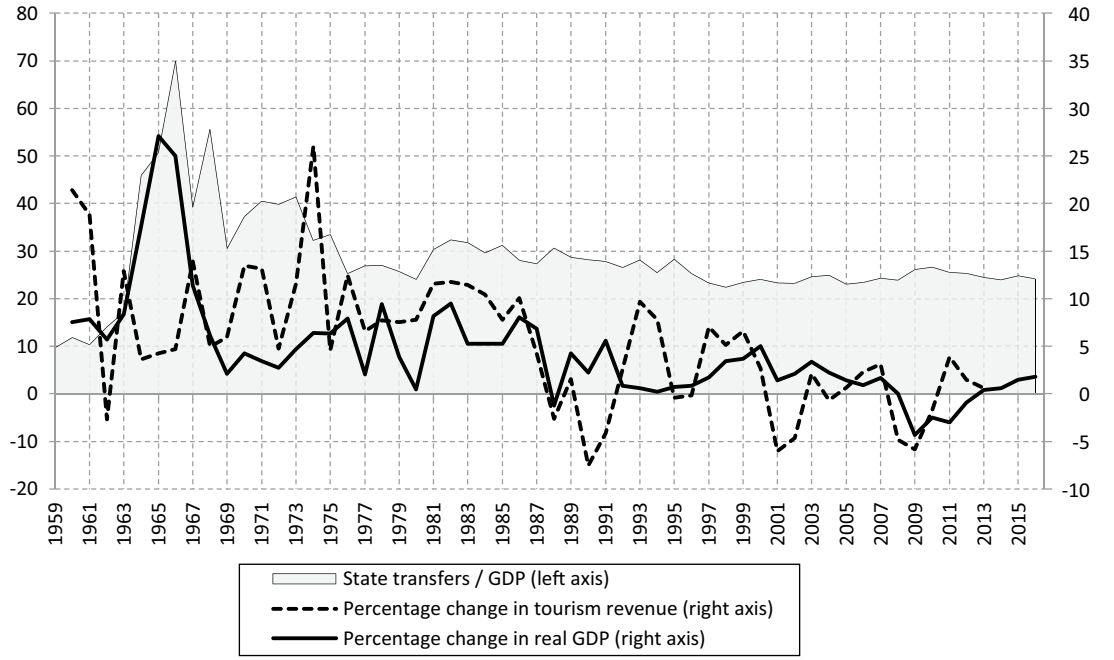
French Polynesia went into severe recession in 2009, which lapsed into economic depression[1]: real GDP fell by 10.2% between 2008 and 2012 according to the final accounts (ISPF, 2018). The magnitude of this depression, which saw the unemployment rate almost double, from 11.7% in 2007 to 21.8% in 2012[2] and the employment rate fall almost constantly from 53.0% to 44.1% over the same period, suggests that this phenomenon is more than a mere cyclical crisis. The hypothesis of a major structural crisis is underpinned by the observation of a deceleration in the real per capita growth rate between 2001 and 2007, which on average has dropped to virtually zero. The effects of 9/11 alone, as significant as they have been on the tourism sector, the territory's largest industry, cannot explain this drop in growth, as other Pacific Islands were able to recover quickly. It is true that the political instability experienced by the territory between 2004 and 2014, with no less than twelve changes of French Polynesia's President[3], has contributed to creating a climate that is unfavourable to growth, both in terms of public investment and investment by private companies. However, it can be observed that the deceleration began well before this period of political instability (Figure I). The arrival of the Pacific Testing Centre (CEP) in 1960 led to an explosion in economic growth for about a decade, with a doubling in the standard of living. However, it also marked the beginning of dependency on State transfers, which after reaching a peak of 70% of GDP in 1967, stabilised around 30% in the 1970s and 1980s. The first growth slowdown was observed in the late 1970s. A second deceleration in growth was seen from 1988, accompanied by a slight decline in the share of government transfers from the mainland to GDP. After the end of nuclear testing in 1995, rapid growth in international tourism in French Polynesia gave rise to hopes that a new economic driver would emerge. Nevertheless, while global tourism increased by 83% between 2000 and 2016, tourism in Tahiti and its islands fell by 23% over the same period (Boxes 1 and 2).

The hypothesis of a serious structural crisis has already been put forward, in particular

1. We use a common definition of economic depression: GDP decline that either exceeds 10% or lasts more than three years.
2. According to the five-year censuses of 2007 and 2012.
3. http://www.polynesie-francaise.pref.gouv.fr/layout/set/print/Les-elus/Le-President

Figure I
Economic growth, growth in tourism income and transfers from the State in French Polynesia (%)



Note: Due to the high volatility of data collected during the period 1960-1975 (Blanchet, 1984), the annual variation rate in real GDP is smoothed out using a 3-year moving average over this period.
Scope: French Polynesia, economy as a whole.
Sources: database built by authors based on the economic accounts of Insee (1960-1976), ITSTAT (1976-1996), the ISPF (1987-2014), and CEROM (2015-2016) (see box 3). Calculations by the authors.

in the conclusions of the General Assembly of the French Overseas Territories (2009), pointing out that the Polynesian economic crisis "*comprises both economic and structural factors*" and "*recessive trends can be interpreted as signs of a shortcoming in the growth model"* or in a report from Standard & Poor's (2010), stating that: *"the recession highlights the limits of the Polynesian business model"*. In this context, it appears necessary to take the analysis of these structural problems to a deeper level, by examining the determinants of growth in the Polynesian economy over an extended period, through a growth accounting

Box 1 – **The Pacific Testing Centre (CEP)**

In July 1962, French Polynesia was chosen as a testing site for French nuclear weapons. The Mururoa Atoll was designated as a firing field, with the Hao Atoll serving as an advanced base and the Tahitian island as the rear and administrative base of operations. Between 1966 and 1974, 46 air tests were carried out, followed by a series of underground tests under the lagoons of Mururoa and Fangataufa, i.e. 147 tests between 1975 and 1995. A moratorium was decided by President Mitterrand in 1992; then the tests resumed under the Chirac Presidency in 1995, before being definitively interrupted the following year.

Prior to the start of the CEP, the population was 100,000 inhabitants. The economy consisted mainly of primary production activities (coconut oil, coffee, vanilla, nacre, phosphate), export-oriented, and self-sustaining activities (fruit harvesting, fishing). In twenty or so years' time, this economy was brutally transformed under the effect of the CEP (see Blanchet, 1984; Poirine, 1996). Investment spending for the construction of transport infrastructure and logistics, in particular the construction of the Tahiti-Faa'a Airport, opened in 1961, as well as operating expenses, were huge. Personnel expenses were multiplied by a factor of 26 from 1962 to 1970 in military administrations and 9 in civil administrations (Blanchet, 1984, p. 37). French financial transfers to French Polynesia were multiplied by 10 during the same period, reaching almost 70% of GDP in 1966 (CEROM, 2007, p. 17). This explosion in spending was accompanied by a rapid increase in the number of companies present on the territory: in 1965, more than 1,000 companies were already working for the CEP (Blanchet, 1984, p. 32). Financial transfers from the State also came along with an influx of staff, technicians and civil servants. As in other countries, the rapid expansion of one sector in the specific economy came at the expense of other existing sectors (similar to the "Dutch syndrome" effect), in some cases causing their extinction (this was the case with phosphate mining in Makatea or coffee production). The contribution of the administrations to GDP almost tripled in the 1960s, from 12% to 34%, while that of small businesses fell by nearly half, from 60% to 33% during the same period (Blanchet, 1984, p. 37).

Box 2 – **The status of French Polynesia**

French Polynesia' status has evolved towards greater autonomy, from the overseas territories defined in the 1946 Constitution, in which the Governor remained responsible for drawing up and enforcing the decisions, until the organic law of 2004. The law of 6 September 1984 introduced the first autonomy status. New powers, particularly in the economic field, were granted to the territory in 1996. Lastly, French Polynesia, a French overseas territory (COM) since the 2003 constitutional review, gained common law powers in all areas not granted outright to the French State in 2004. The latter continues to hold power as regards nationality, electoral law, civil law, justice, foreign policy, defence, security and public order, currency and credit.

French Polynesia can define its own rules in all other areas, through acts of the General Assembly, including the "country laws", which remain subject to a litigation regime before the French Council of State. In an economy characterised by a wide range of opportunities for public authorities' intervention in economic life, autonomy status confers on the government and its President many discretionary powers in terms of subsidy allocation, investment control, in particular foreign investments, regulation of economic activities and action via public or semi-public companies – generally public institutions of an industrial and commercial nature (EPIC) and semi-public companies (SEM). The 2015 Report by the Laws Commission of the French National Assembly, presented by Jean-Jacques Urvoas, regrets "*the detrimental absence of assessment… of transfers of powers that might otherwise measure their relevance and efficiency*" (Urvoas, 2015, p. 79). It also stresses that powers continue to be exercised in an incomplete and imperfect manner (idem, p. 79).

In 1976, French Polynesia created the Institut Territorial de la Statistique (ITSTAT), which became in 1999 the Institut de la Statistique de la Polynésie française (ISPF), under the supervision of the Minister of the Economy of the local government. Its powers are, as is the case of ISEE (Institute of Statistics and Economic Studies) in New Caledonia, similar to those of a national statistics institute; only the five-year census of the population remains under the State's control via Insee (Insee, 2016).

exercise. In addition to the obvious interest of reconstructing long-term series on real GDP, real GDP per capita, the formation of capital, trends in the labour force and the accumulation of human capital, this makes it possible, above all, to highlight problems in labour productivity and total factor productivity (TFP), that is, the share of growth that is not explained by the increase in capital and labour volumes, for French Polynesia. TFP can be considered a measure of efficiency and technical progress, if measurement errors, in particular those regarding factor utilisation (for example, on the rate of production capacity utilisation and the hours worked per inhabitant) are not significant. The spotlight on TFP and its possible determinants should help explain why current growth is low and open up new prospects as regards economic growth policy.

This article offers, in the first section, a comparative analysis of trends in real GDP and real GDP per capita in French Polynesia compared with the rest of France over the long term. In the second section, a traditional growth model is used to analyse the contributions of the physical capital, human capital and labour factors, as well as TFP, to growth in French Polynesia. In the third section, analysis will focus on questions of productivity. A few explanations as to why TFP's contribution to growth continues to be low will be offered in the fourth section.

A comparative analysis of trends in real GDP and growth in French Polynesia and in France from 1960 to 2006

The comparison shown below between data on GDP growth in French Polynesia and those on mainland France (including overseas departments) may come as a surprise, considering the significant structural differences between the two economic spaces. The features specific to a remote island economy, such as Tahiti and its islands, that will be elaborated in the last section of the article, are a possible explanation for low performance in productivity. The comparison with France (including overseas departments) is nonetheless useful, at least as a benchmark for assessing Polynesian performance. It is furthermore justified by the fact that transfers from mainland France have for some thirty years amounted to between 20% and 30% of Polynesian GDP, that imports and technologies often come from mainland France, and that, more generally, many economic relationships exist between the two territories due to institutional, administrative and cultural ties (Box 3).

To take into account the latest change in national accounting system in French Polynesia, real GDP per capita is compared to that of France, initially between 1959 and

Box 3 – **Source and construction of the database for analysis of growth in French Polynesia**

The macroeconomic series required to analyse growth in French Polynesia over the long term have been reconstructed since 1959, sometimes by interpolation, due to the lack of data retropolation following methodological advances (implementation of new national accounting systems in French Polynesia in 1976 and 1987) and changes in database. To date, the last available final estimate of GDP is that of 2014 (ISPF, 2018) and the last early estimate dates back to 2016 (CEROM, 2017). However, due to a significant change in methodology since 2006, the series cannot be linked before and after the conformity-assurance measures taken to align with the SEC 95 European Accounting System, for which the base year was 2005[a]. This modernisation of accounting standards has resulted in significant differences between the old and new GDP values and components thereof for the transition year 2006. Thus, exports and imports of goods and services, which were respectively valued at 66.4 and 175.5 billion CFP francs according to the old methodology (ISPF, 2009), were re-estimated at 113.1 and 203.1 billion francs (resp. + 70.3% and +15.7%) following the switch to the SEC 95 standard (ISPF, 2012)[b] and the change in real GDP between 2005 and 2006 is 1.5% higher according to the new methodology (which relies on the ERETES information system[c]). Moreover, a GDP deflator was created while the old methodology used the consumer price index to move from current CFP francs to constant CFP francs.

More precisely, long-term series for GDP and other variables described below have been carefully constructed, to optimise their consistency, from the following sources:

- the series of nominal GDP, real GDP and its components are available from the annual economic accounts drawn up successively by the INSEE (from 1960 to 1976), ITSTAT (from 1976 to 1996), which became ISPF (from 1987 to 2006), and, since the adoption of the ESA 95, ISPF (final accounts from 2006 to 2014), and CEROM (early accounts for 2015 and 2016). The long-term series were built until 2006 by retropolation, starting from the earliest (1987-2006), and harmonising the base year (2005) using the short series published by Blanchet from 1960 to 1980 (1984) and by the IEOM (each year from 1971 to 1998); ➔

2006, then separately over the period from 2005 to 2011 in Figure II.

After very quickly catching up with the pack in the sixties, thanks to the arrival of the Pacific Testing Centre (CEP) dedicated to nuclear testing, and the very high public transfers from mainland France (with a peak at almost 70% of GDP in 1966, followed by an average of 30% until the end of the testing), which had the effect of profoundly transforming the economy and society, especially in Tahiti, Polynesian living standards grew less swiftly than in France until the end of the eighties. Moreover, the stagnation in GDP per capita in French Polynesia since the late 1980s can be seen clearly, as can the growing gap between GDP per capita on the mainland versus the territory, and more markedly still since the recent global crisis (+ 1% in France, from 2008 to 2016, compared with - 10% over the same period in French Polynesia). It is important to note that the two scales on this chart reflect the fixed exchange rate in effect (without any devaluation since 1949), while the cost of living is notoriously higher

Box 3 (contd.)

- tourism income shows total expenses in current CFP francs from international tourists (i.e., expenses by non-residents in French Polynesia). The data came from the biannual surveys carried out by the ISPF (from 1997), interpolated by the IEOM since 2007 for the balance of payments, and arithmetically by the authors between 1997 and 2007, as well as the estimations of the ITSTAT (the former name of the ISPF before 1999), between 1986 and 1996, estimates by Blanchet (1984) for the period between 1960-1980 and estimates of the authors from the linear interpolations of the ratio between tourist income and GDP between 1980 and 1985.

- transfers from the State are net, and calculated on the basis of the balance of payments debits and credits, estimated by the IEOM since 1998, and extrapolated from the IEOM's gross estimates (annual reports since 1980) between 1980 and 1997 and from Blanchet (1984), for the period 1960-1980, the latter being adjusted to obtain net values.

The recent global economic crisis has hit Polynesia hard, with real GDP, measured according to the new methodology, dropping by 4.2% in 2009, 2.5% in 2010, 3.0% in 2011, and 0.9% in 2012, for a total of 10.2%, that is higher than the threshold of 10% defining an economic depression, before slowly recovering and increasing by 0.4% in 2013, 0.6% in 2014 (final accounts), 1.5% in 2015 and 1.8% in 2016 (early accounts). In the absence of more precise data to estimate the causes of changes in productivity since 2007, we chose to limit our sample to the period 1959-2006 to analyse long-term growth until the crisis.

France's macroeconomic data covers mainland France and the overseas departments (DOM), excluding Mayotte, but does not include the accounts of local authorities and overseas territories. In the rest of this article, we will use the terms "France" and "mainland" to designate this economic entity, even though technically, it includes the overseas departments.

Origin of the data used:

- ISPF: Institut de la Statistique de la Polynésie Française (since 1999, formerly known as ITSTAT, Institut Territorial de la Statistique de la Polynésie Française - http://www.ispf.pf/ISPF)

- Insee: French National Institute of Statistics and Economic Studies (see Economic Tables from 1960 to 1976)

- IEOM: Institut d'Émission d'Outre-Mer (see Annual Reports or Balance of Payments Reports)

- IMF: International Monetary Fund (see International Financial Statistics)

- World Bank (see Global Development Indicators)

Data have also been excerpted from the following articles and/or works: World Bank (2010), Barro and Lee (2013), Blanchet (1984), Dropsy *et al.* (2007), Dropsy (2007), Kamps (2006), Poirine (2011, 1996).

Box notes:

(a) http://www.ispf.pf/themes/EconomieFinances/Comptesconomiques/Publications.aspx

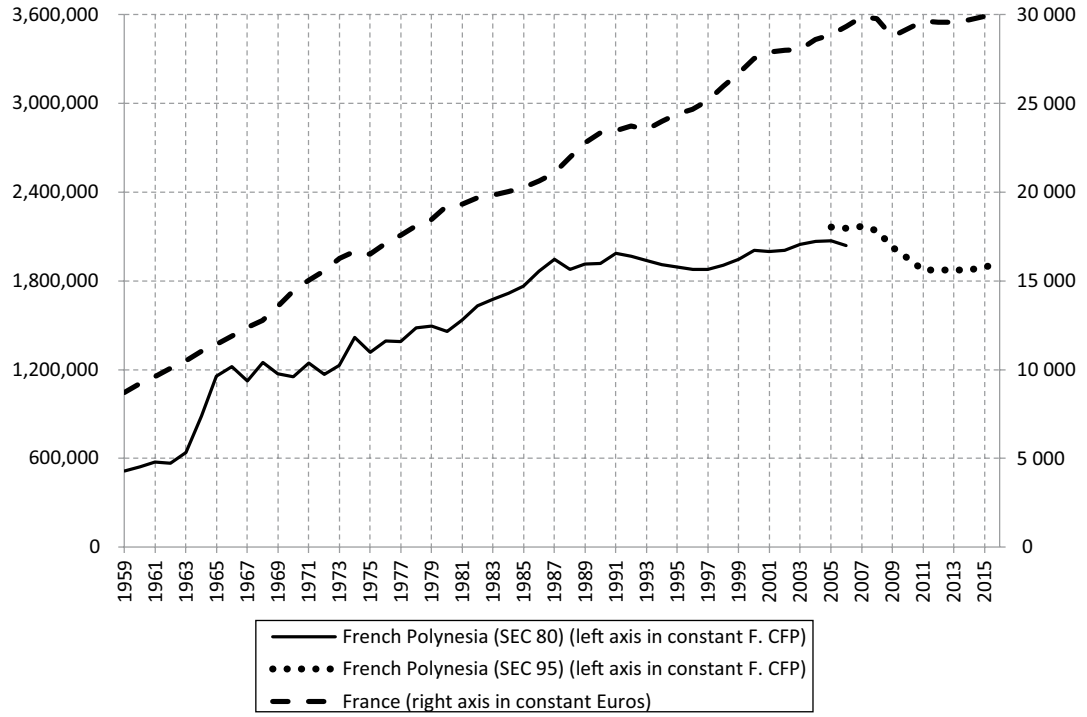
(b) According to the old Polynesian standard before 2006, exports of goods and services were defined as the sum of the exports of goods, extracted from the data provided by the customs services then adjusted, and tourism expenses, taken from a biannual survey carried out by ISPF.
http://www.ispf.pf/bases/Repertoires/CommerceExterieur/Prsentation.aspx
http://www.ispf.pf/bases/Tourisme/EDT.aspx
According to the new standard, exports and imports of goods and services also include balance of payments data provided by the IEOM, in particular services excluding travel that were not previously taken into account.

*(c) ERETES is "*a support module for the establishment of National Accounts in compliance with international standards of the SCN 1993*", the owners of which are Eurostat, the French Cooperation represented by INSEE and the user countries represented by the Brazilian Institute of Geography and Statistics, IBGE (*Instituto Brasileiro de Geografia e Estatística*). Data preparation consists of the following steps: (i) set up a loading table specific to ERETES for each of the national accounting sources, before incorporating the accounting information into the database; (ii) balance resources and jobs in the economy for each product/service; (iii) compare and contrast intermediate consumption (IC) from ERE with IC demand that comes concurrently from fiscal sources, EAE and administration accounting data; (iv) derive a balanced inter-industry exchange table (IET) based on these trade-offs; (v) determine the level of GDP, and balance out the inter-agent matrices that make it possible to obtain a balanced table of integrated economic accounts (TCEI).*

in French Polynesia, which accentuates the difference in purchasing power with France. For guidance purposes, a study by the ISPF (2016) estimates an additional cost of 55% for a representative shopping basket purchased in this French overseas collectivity, compared to the mainland area in 2016. On the other hand, the same study compares the cost of a representative shopping basket in mainland France for the Polynesian consumer, which would be 19% lower than in French Polynesia. According to international standard practice, a Fisher-type index, i.e. a geometric average of the two Laspeyres indices representing price differences for each basket, is used to offer a symmetrical measure of the difference in price levels between the two territories. In our case, this Fisher index is equal to $1.39 = (1.55*0.81)^{1/2}$, i.e. a difference in price level of 39% in 2016. Thus, the GDP per capita of French Polynesia (2.121 million f. CFP) in 2016, equal to 52% of that of metropolitan France (€34,342) at the official exchange rate (1000 f. CFP = €8.38), would in fact be only 37% (= 52% / 1.39) of the mainland standard of living at comparable prices.

Table 1 shows the averages of real GDP, real GDP per capita and their growth rates for different periods between 1960 and 2006 for French Polynesia and France. The first oil shock is a turning point in the global economy, marking the end of the first period (1960-1973) of sharp growth amounting at 6.5% real GDP per capita in French Polynesia, even though the "CEP boom" was felt above all in the sixties. Then, French Polynesia and France experienced high inflation rates from 1974 until the mid-eighties. The end of the second period, 1974-1987, represents a turning point in the Polynesian economy – whereby the 23 October 1987 riots were symptomatic of economic and social malaise – with annual growth of real GDP per capita reduced by half to 3.3% per year. The third period, from 1988-1996, saw this growth fall sharply to become negative (- 0.4% per year), partly due to uncertainties about the Polynesian economic model at the end of the nuclear tests in 1992 and the riots in 1995 following the announcement of their brief restart. The fourth period, from 1997-2000, is one of strong rebound in tourism, particularly from the United States, and even more

Figure II
Real GDP per capita in French Polynesia and France



Note: real GDP per capita in French Polynesia is stated in constant CFP francs, base 2005.
Scale 1000 F. CFP = €8.38.
Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016); authors' estimates. For France: Insee, national accounts, temporary 2016 (base 2010).

so of development for private productive infrastructures and equipment, as well as a strong expansion in the construction sector, which increased its contribution to GDP from 6.3% in 1995 to 7.9% in 2000. This resulted in a particularly dynamic Polynesian economy, with real per capita growth of 1.7% per year. Finally, the last period, from 2001 to 2006, saw the Polynesian economy fall into the doldrums, with zero growth in standard of living, after the fall in tourism and its stagnation, as well as political instability from 2004.

Figure III illustrates the comparison of GDP growth per capita in French Polynesia and France, period by period. The arrival of the CEP in the sixties, which created a real "economic shock", doubling the average purchasing power of Polynesians in ten years or so, enabled rapid catch-up in living standards, thanks to a positive gap of almost 2% in annual growth compared with France. Over the next two decades, the average growth rate weakened, but was still enough for the Polynesian standard of living to double. The economic catch-up with France continued after the oil crisis, thanks to growth exceeding the mainland rate by 1.5% in the second period ending in 1987. Since that year and up to 2006, the Polynesian economy has seen its real GDP per capita near-stagnating, despite a brief upturn in 1997-2000, while that of France grew by 40% over the same period. While the latter has implemented structural macroeconomic policies supporting the continuation of European integration (developing competition, privatisation, more direct taxation, etc.), French Polynesia, which has enjoyed new autonomous status since 1984 with a very high degree of flexibility in terms of fiscal, social and economic policies, has not benefited directly from the same structural adjustments.

Observable growth factors in French Polynesia: capital, labour, human capital

The accounting decomposition model (Box 4) can be used to calculate the respective contribution of the observable growth factors – capital, labour and human capital – and that of TFP.

The accumulation of capital and investment dynamics

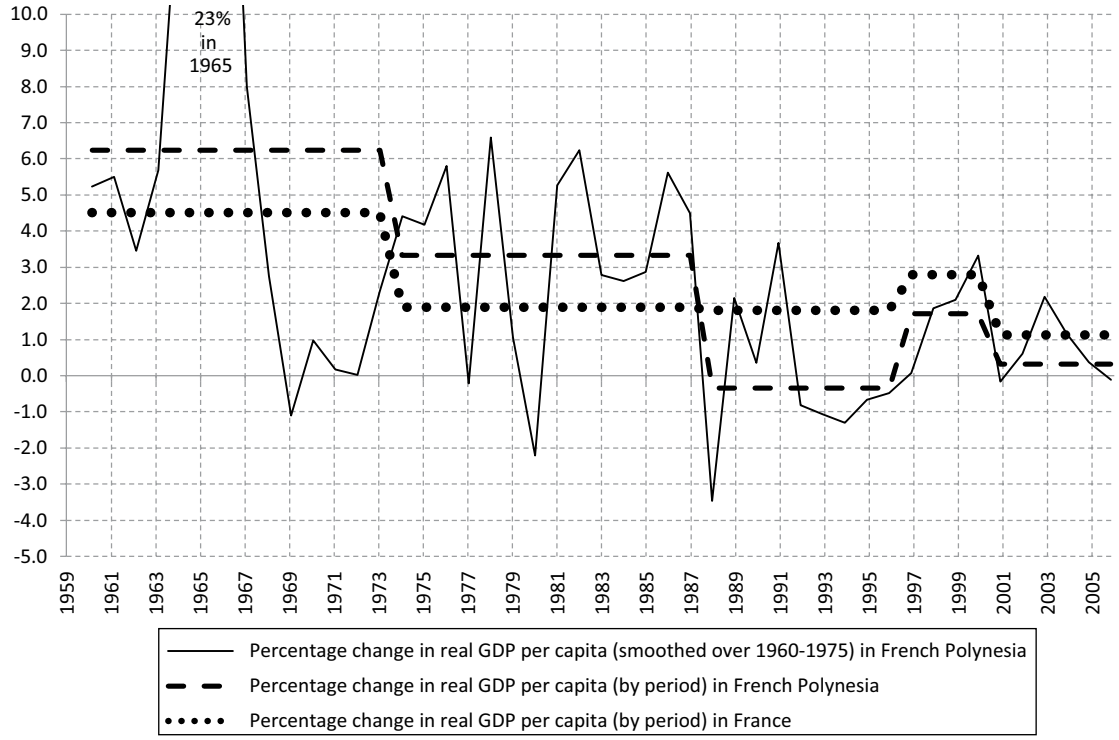
The accumulation of capital is linked to savings and the expected profitability of its productive use in investment. This profitability itself depends on various factors that are more or less controllable locally. Growth and development specialists stress the importance of creating and maintaining a "climate conducive to investments", referring to a set of factors that can be classified in three

Table 1
Standard of living and economic growth, French Polynesia and France

Average (in millions of f. CFP at constant 2005 prices)					
	1960-73	1974-87	1988-96	1997-2000	2001-06
French Polynesia					
Real GDP	106,764	246,540	391,397	442,944	506,010
Real GDP per capita	0.99	1. 58	1. 92	1. 93	2. 04
Average annual growth rate (%)					
	1960-73	1974-87	1988-96	1997-2000	2001-06
French Polynesia					
Real GDP	9.8	6.2	1.6	3.5	1.7
Real GDP per capita	6.5	3.3	- 0.4	1.7	0.3
France					
Real GDP	5.5	2.4	2.2	3.3	1.8
Real GDP per capita	4.5	1.9	1.8	2.8	1.1

Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016), base 2005; authors' calculations. For France: Insee, national accounts, 2016 provisional.

Figure III
Per capita economic growth in French Polynesia and France (%)



Note: Due to the high volatility of data collected during the period 1960-1975 (Blanchet, 1984), the annual variation rate in real GDP is smoothed out using a 3-year moving average.
Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by authors based on the economic accounts of the Insee (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016); authors' calculations. For France: Insee, national accounts, 2016 provisional.

Box 4 – **Accounting breakdown of GDP growth per capita**

Quite traditionally, as in the various growth accounting exercises, we are framing the analysis within a growth model inspired by Solow (1956) and Mankiw. *et al.* (1992). We assume, for the sake of simplicity, that the territory's production (GDP) can be represented by a Cobb-Douglas function with constant returns. GDP, Y, is then based on the use of capital factors, K, labour, L, and human capital H incorporated into labour, and a residual factor A, total factor productivity (TFP), which represents the effect of technological changes, but also a set of other factors such as the functioning of the markets, the organisation of work or public governance. We adopt a specification where human capital H enters the production function by increasing the contribution of the labour factor, i.e. $H = hL$, with h being the quantity of human capital per worker (see for example Barro and Lee, 2013; Weil, 2005, p. 172).

Under these assumptions, production is described as:

$$Y = AK^{\alpha} (hL)^{1-\alpha} \quad (1)$$

where, given the assumption of constant returns, the coefficients α and $(1-\alpha)$ represent, respectively, the share of capital and labour in territorial income. In the absence of data on the shares of labour and capital in added value in French Polynesia, the value of the coefficient α is assumed to be similar to that of mainland France and taken equal to 30%, the average value estimated by Pionnier (2009) for France over the period 1949-2008, and used by Bergeaud *et al.* (2014, 2016).

The variable h is approached based on the number of years of schooling per worker, taking into account the expected return on investment in years of additional studies. Other indicators, such as enrolment rates at school, literacy rate, national education expenditure and income expectancy, can be used to estimate human capital (Liu & Fraumeni, 2014); our choice was made in light of the reduced availability of these data, first, and the relevance of the variable chosen, second. According to a method that has now become common (Barro & Lee, 2013), human capital is linked to years of studies as follows: $h = exp^{(\theta.E)}$, where E represents the average number of years of schooling in the population aged 15 and over, and θE represents the efficiency of a working unit having accumulated E years of schooling.

By expressing the Cobb-Douglas function per worker ($y = Y/L$), the equation (1) becomes:

$$y = Ak^{\alpha}h^{1-\alpha} \quad (2)$$

→

categories: 1) macroeconomic policy and foreign trade policy, 2) infrastructures and 3) governance and institutions (Weil, 2005; Stern *et al.*, 2005).

In French Polynesia and for several years, many of the factors defining investment climate have not been conducive to growth. Political instability, which was high between 2004 and 2013, has created uncertainties unfavourable to investment, but it affected only the very last part of the period studied. In the longer term, the strong local protectionism, mistrust of foreign direct investment, and nervousness of local investors are probably as many obstacles to the overall dynamism of the economy and, consequently, to investment.

As regards infrastructures, French Polynesia has certainly invested heavily in urban planning and transport during the years of the CEP, but this type of investment has since slowed down. The dynamic of investments in French Polynesia reflects the difficulties resulting from this unfavourable climate. Figure IV shows that the investment and capital to GDP ratios (Box 5) follow an explosive trajectory in the sixties connected with the CEP, then start a decreasing trend since the start of the 1980s (following the reduction in the number of nuclear tests), contrary to the national trend shown in comparison, despite the various tax incentives.

Table 2 shows the annual growth rates of net capital stock to employment ratios, distinguishing between the public and private sectors. The impact of the massive investments connected with the arrival of the CEP and the different airports in the 1960s can be very clearly seen here, with an annual increase in public capital stock by public employment of 16.4% per year during the first period, declining during the following periods. Likewise, the magnitude of private investment led to a rapid increase in the real net private capital stock by private employment during the first two periods, before plummeting between 1987 and 2000, followed by a stagnation since the start of the new millennium (the increase in private investment being offset by an increase in employment).

The labour factor and demography

The rise in the labour factor is due to demographic changes, first the natural change, and secondly migration, in both directions, between French Polynesia and foreign territories. The total population grew at a high annual rate and more than doubled between 1960 and 1987, growing more slowly thereafter and up to the present time. Table 3 presents key data on the population, employment and their growth.

The share of public employment is 28% on average (12% corresponding to State employment), a relatively stable ratio from the 1960s up to 1996, at which point a temporary increase in the proportion of private-sector jobs was seen into the late 1980s, followed by a return to the long-term average.

The employment rate of people between ages 15 and 64 is very low in French Polynesia, compared with other territories or countries, at around 53% in 2007, before the onset of the crisis, compared to 63.7% in France in

Box 4 (contd.)

In logarithmic terms, equation (2) becomes:

$$\text{Log}(y) = \text{Log}(A) + \alpha\text{Log}(k) + (1-\alpha)\text{Log}(h) = \text{Log}(A) + \alpha\text{Log}(k) + rE \quad (3)$$

with $(1-\alpha)\text{Log}(h) = (1-\alpha)\theta E$, and where $r = (1-\alpha)\theta$ represents the marginal effect of an additional year of study E on real GDP per worker, i.e. the semi-elasticity of labour productivity relative to the level of education. Consequently, the growth rate of real GDP per capita (y) is proportional to the rate of technical progress (A), to the rate of variation in the capital ratio per employee (k), and to increases in level of education (E) across the population. The educational return parameter r is assumed to be equal to 7%, in the middle of the range of microeconomic estimates (between 6% and 8%), according to the estimates from Bergeaud *et al.* (2018).

Equation (3) makes it possible to estimate the TFP, i.e. the residual factor A, after setting the parameter values for α and r:

$$\text{Log}(\text{PGF}) = \text{Log}(y) - 0.3\text{Log}(k) - 0.07E \quad (4)$$

the same year (Venayre, 2009). This low level reveals the existence of substantial potential for productive use of the labour factor, which could contribute to growth, if the required investments were made.

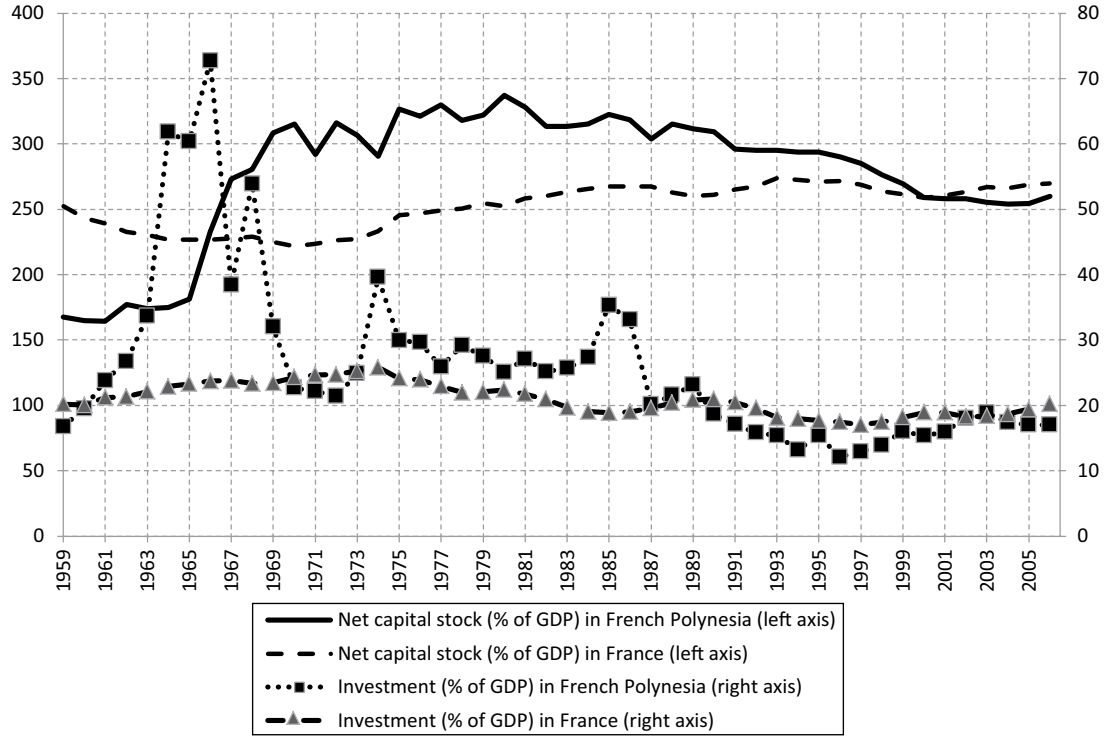
The accumulation of human capital

While human capital is defined by the OECD (2001c; 2007) as "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being", the "proxy" variable used to estimate human capital per worker ("*h*" in equations 1 and 2 of box 4) is the average number of years of schooling (*E*) for the population ages 15 and above, according to the methodology defined by Barro and Lee (2013)[4].

French Polynesia has made significant efforts to attain the objective of increasing enrolment, accompanied by increasingly high degrees, thereby accumulating human capital. For the

4. *http://www.barrolee.com.*

Figure IV
Net capital stock and investment in French Polynesia and France (% of GDP)



Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources for French Polynesia: Database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016), (see boxes 3 and 5); authors' calculations. For France: Insee, national accounts, 2016 provisional.

Table 2
Average annual growth rate of real net capital stock to employment ratios in French Polynesia

(%)

	1960-73	1974-87	1988-96	1997-2000	2001-06
Real net capital stock to total employment ratio	10.8	3.9	- 1.0	- 2.1	- 0.2
Real net capital stock to public employment ratio	16.4	1.2	- 0.5	- 0.8	- 1.4
Real net private capital stock to private employment ratio	6.9	6.4	- 1.3	- 2.9	0.1

Scope: French Polynesia, economy as a whole.
Sources: Database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016), (see boxes 3 and 5); authors' calculations.

Box 5 – **Reconstructing series of capital stock**

A series of capital stock K is reconstructed, first for French Polynesia and secondly for France, using the same permanent inventory method (OECD, 2001a, Chapter 5; 2001b, p. 89-91; 2009, p. 127-133; 2013):

$$(1)\ K_t = I_t + (1- \delta)\ K_{t-1}$$

where I represents investment (gross formation of fixed capital) and δ the depreciation rate.

By recursive substitution, we obtain:

$$(2)\ K_t = (1- \delta)^t K_{1+} \Sigma^{t-1}_{i=0} (1- \delta)^i I_{t-i}$$

where the initial stock of capital K_1 is determined (OECD, 2009, p. 131) by:

$$K_1 = I_1 / (\delta+g_I)$$

with g_I annual rate of real growth in investment in the long term.

Piketty and Zucman (2014, pp. 1264-1265) criticise the use of this methodology and recommend the use of national balance sheets to estimate income wealth ratios between 1970 and 2010 for eight economies, or even from 1870 for Germany, 1770 for the United States, and 1700 for France and the United Kingdom.

However, the ratio of fixed capital consumption (i.e. the depreciation suffered by fixed capital) to GDP is relatively similar and stable for French Polynesia and for France, around 12% to 14% for the last three decades. In contrast, the ratio of national wealth to GDP in France is on average equal to 3.7 from 1970 to 1999 before increasing very sharply to reach 6 in 2009, while the ratio of net capital to GDP increases from 2.3 to 2.8 from 1970 to 1979 before stabilising until 1999, and increasing slightly to 3.1 in 2009. In any case, as national balance sheets are not available for French Polynesia at such a disaggregated level as for France, it is not possible to replicate the Piketty and Zucman methodology for French Polynesia.

The change in net capital is equal to the net formation of fixed capital, i.e. domestic investment (gross formation fixed capital) minus depreciation (fixed capital consumption), the rate of which is estimated at 5% on average for France and for French Polynesia (World Bank 2010, p. 143). The net initial capital stock (initial investment divided by the sum of the depreciation and real growth rates), respectively for France and French Polynesia, is estimated based on the average depreciation rate of 5% and the average growth rate, 3% for France and 5% for French Polynesia respectively.

In this regard, Bergeaud *et al.* (2016) estimate the depreciation rate of equipment at 10% and that of buildings at 2.5%. We do not have any disaggregated investment data for these two types of assets in the long term. However, recent data (since the change in methodology of economic accounts in 2006) make it possible to conclude that the share of equipment and construction and public works in the total FBCF has been approximately equal for some years, but without any indication for the preceding decades. Assuming that this split is more or less constant over time, which is very unlikely, given the economic shock of the C.E.P. in the 1960s, the average depreciation rate for equipment and buildings would be 6.25%, a rate close to the overall rate of depreciation applied (5%). With these parameters, the ratio of net capital stock to GDP is estimated on average over the period 1960-2006 at 2.6 for France and 2.8 for French Polynesia.

Table 3
Demography and employment *L* in French Polynesia

Annual average per period					
	1960-73	1974-87	1988-96	1997-2000	2001-06
Total population *	104,143	154,307	203,933	228,925	248,083
Total employment L**	36,194	53,238	68,621	80,001	89,722
Public employment ***	10,219	15,031	19,360	21,030	25,779
Private employment ****	25,975	38,207	49,261	58,971	63,943
Average annual growth rate (as %)					
	1960-73	1974-87	1988-96	1997-2000	2001-06
Total population *	3.3	2.7	2.0	1.8	1.5
Total employment L**	3.3	2.4	2.1	3.0	2.0
Public employment ***	3.3	2.4	2.0	1.4	3.4
Private employment ****	3.3	2.4	2.1	3.5	1.5

Note: * data interpolated between censuses; ** active workers with a job in the sense of the census; *** public sector employees (local authority, municipalities, State); **** salaried employees in the private sector and non-salaried staff.
Scope: French Polynesia, economy as a whole.
Sources: ISPF, High Commission; authors' calculations.

purposes of growth accounting, the average level of human capital of the working population was calculated based on the average number of years of schooling in the population ages 15 and above: it doubled between 1960 and 2006, increasing from 3 years in 1960 to 6 years in 2006. Table 4 illustrates this progression. However, there was a slowdown in this accumulation of human capital in the second half of the 1990s. Appendix 2 makes it possible to analyse the robustness of the TFP calculation in French Polynesia and its gap with France with respect to hypotheses on the calculation of level of education *E*.

Labour productivity and total factor productivity

Equation (2) in box 4 reflects the GDP per person employed, *y*, as a function of capital, labour, human capital and TFP. The variable *y* corresponds to a simple definition of labour productivity, which, as can be seen in equation (3), depends on TFP and capital intensity *k* and quality of work (linked to human capital). Figure V shows the trend in labour productivity in French Polynesia, compared with France, bearing in mind the overvaluation of the CFP Franc, which tends to significantly underestimate the real gap between the two territories.

This figure shows a very rapid increase in labour productivity at the start of the 1960s, following the CEP shock, then a far more modest trend over the next two decades. From the start of the 20th century, a decline in labour productivity can be seen, followed by a slight rebound in 1997, and a further decline after 2003.

Differences between changes in annual growth rates in labour productivity in the public and private sectors can also be seen in Table 5. Public sector labour productivity, after a very sharp increase in the 1960s, has been growing at lower rates than those observed in private-sector since 1973. Moreover, labour productivity in the public sector, apart from a brief period in the late 1980s, has fallen since 1988 while it is on average increasing slightly in the private sector since 1997.

The issue of low labour productivity in French Polynesia (in level and in growth rate) had been discussed in a CEROM study (2007, pp. 104–106). It was noted that labour productivity in Polynesia, measured by the ratio of market value added to private employment, was in line with the average for French overseas departments, but declined significantly between 1995 and 2003, contrary to what was noted in other French overseas departments or territories. Although the analysis of this ratio itself offers a wealth of lessons, we prefer to focus on total factor productivity, as a rise in labour productivity, measured by the ratio Y/L, disregards any possible changes in human capital H and physical capital K. It can therefore hide a capital increase K made available to workers, or for instance the increase in their human capital.

Table 4
Stock of human capital in French Polynesia and France (educational attainment *E* measured by the number of years of schooling in the population aged 15 or over)

	1960-73	1974-87	1988-96	1997-2000	2001-06
In level (annual average per period)					
France	4.7	6.2	7.9	9.3	9.8
French Polynesia	3.0	4.2	5.2	5.4	5.6
Variation (average annual growth rate, in logarithmic difference, per year)					
France	1.7	2.0	2.4	2.1	0.8
French Polynesia	2.9	2.0	1.7	- 1.1	2.4

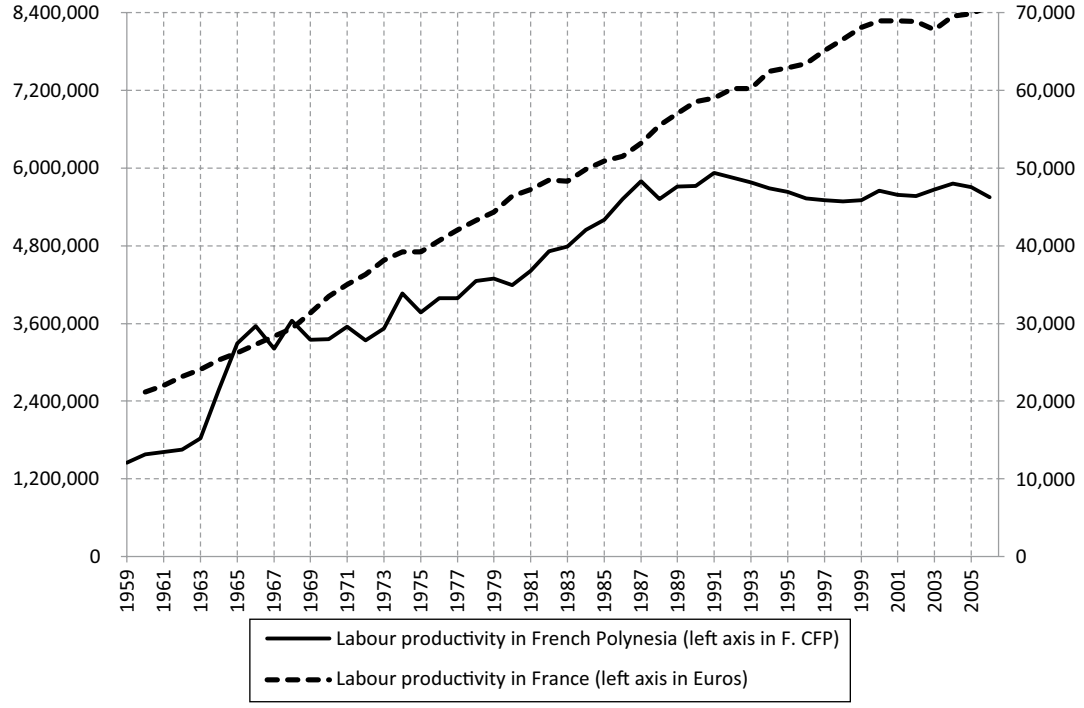
Note: For France, estimates are based on Barro and Lee (2013). The average number of years of schooling is set at 5 for non-graduates (i.e. early childhood education), 9 for graduates of a French CEP or BEPC (i.e. lower secondary education), 11 for a French CAP or BEP (i.e. upper secondary education), 12 years for a French Baccalaureate (i.e. high-school degree), 15 years for a first-cycle diploma (i.e. bachelor's degree), 17 years for a second-cycle diploma (i.e. master's degree). For French Polynesia, data is interpolated between censuses. The average number of years of schooling was calibrated to replicate the level of education between French Polynesia and France estimated at 3.3 years (average from 2004 to 2006) based on the respective data of ISPF and the State of Higher Education and Research, using the methodology of Barro and Lee (2013).
Scope: Population aged 15 or over, French Polynesia and France (mainland France and overseas departments, excluding Mayotte).
Sources: ISPF (census data) for French Polynesia; the State of Higher Education and Research for France; authors' calculations (see Box 4 and Appendix 2).

TFP estimation for the period 1960-2006

We present below the key results concerning the estimated TFP trend over the period 1960-2006 based on the growth breakdown equation (3) (see Box 4), particularly with a coefficient α (share of capital) estimated at 30% and a coefficient r (marginal effect on real GDP growth rate of one additional year of study *E)* estimated at 7%, according to the hypotheses and estimates by Bergeaud *et al.* (2018). The robustness of this estimate is verified by varying the values of both parameters α and r (Appendix 1). Table 6 shows the breakdown in annual growth rates of real GDP per period.

Real GDP growth, at nearly 10% per year during the first period, corresponds very well to the explosion in government spending in French Polynesia (GDP from non-market sector showing an increase of 15% annually) for the construction of the airport in Tahiti and the CEP infrastructures, hence a rapid increase in capital stock, which contributes more than

Figure V
Labour productivity in French Polynesia and France



Note: Real GDP per inhabitant in French Polynesia is stated in constant CFP francs, base 2005.
Scale 1000 F. CFP = €8.38.
Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by authors based on the economic accounts of Insee (1960-1976), ITSTAT (1976-1996), the ISPF (1987-2014), and CEROM (2015-2016). For France: Insee, national accounts, 2016 provisional.

Table 5
Average annual productivity growth rate of French Polynesia

(%)*

	1960-73	1974-87	1988-96	1997-2000	2001-06
Public and private labour (L)	6.4	3.6	- 0.5	0.5	- 0.3
Public sector labour	15.1	2.0	- 0.6	0.3	- 1.5
Private sector labour	4.1	4.3	- 0.5	0.6	0.2

Note: * Annual percentage change in real GDP by type of employment, total, public or private (see Table 3).
Scope: French Polynesia, economy as a whole.
Sources: ISPF, High Commission; authors' calculations.

one-third of growth. It can be noted that the labour factor (+ 2.9%) and TFP (+ 2.4% per year) also contributed significantly to growth during this period.

Over the following period, from 1974 to 1987, the pace of growth slowed, though still remaining high. Real GDP grew faster in the private sector than in the public sector during this period, following the stabilisation of the government's financial transfers to around 30% of GDP. The labour factor is contributing significantly to growth, while the contribution of capital is slowing down. TFP still contributes significantly to growth, at 1.8% per year. The accumulation of human capital contributes on average to 0.6% across all these periods.

Between 1988 and 1996, GDP growth declined to 1.6% per year on average. Only the labour factor and human capital contributed positively over this period, where capital accumulation played a negative role (- 0.3%), as did TFP (- 0.8% per year).

The return of growth seen during years 1997-2000 came through the expansion of the sectors developing the territory's own resources (tourism, fishing, pearl culturing), both under the impetus of public policies and international demand favourable to these products. It should be noted that this growth was mainly based on the contribution of the labour factor, while TFP contributed significantly with an average of 1.6% per year.

Lastly, over the last period (2001-2006), growth slowed again (annual rate of 1.7%), due to cumulated difficulties in the three driving sectors, tourism, fishing and pearl culturing. Growth is still supported by the contribution of the labour factor and the contribution of human capital; however, the contribution of TFP became negative (- 1.2% per year on average). Figure VI shows the trend in TFP in French Polynesia. It points out the drop in Polynesian TFP's progression compared with TFP in France, from the end of the 1980s.

Cyclical fluctuations in economic activity in French Polynesia do not always lead to immediate adjustments on the labour market, particularly in the sectors protected from competition. Thus, in the unfavourable phases of the cycles, the observed decreases in TFP can be interpreted as the consequences of delayed or even non-existent adjustments in employment rather than actual losses in technological progress. While this mechanism is well known (see for example Fernald, 2014), the conditions of the Polynesian economy are likely to worsen its scope.

However, these cyclical adjustments cannot explain the chronically low TFP or even

Table 6
Estimation of total factor productivity (TFP) for French Polynesia

Breakdown of annual real GDP growth rate (in logarithmic difference, per year*)					
	1960-73	1974-87	1988-96	1997-2000	2001-06
Real GDP growth rate (Y)					
Real GDP (Y) (public and private sectors)	9.3	6.0	1.6	3.5	1.7
Public sector real GDP	15.3	4.4	1.5	1.7	1.9
Private sector real GDP	7.5	6.6	1.6	4.0	1.6
Contribution of factors and TFP to real GDP growth rate (public and private) (percentage points)					
Labour (L) **	2.9	2.4	2.1	2.9	2.0
Capital stock (K)***	3.3	1.2	- 0.3	- 0.7	- 0.1
Human capital (E) ****	0.6	0.6	0.6	- 0.4	1.0
PGF *****	2.4	1.8	- 0.8	1.6	- 1.2

Notes: * the real GDP growth rate is stated in logarithmic difference in this table and can therefore differ from the real GDP growth rate in Table 1. ** Contribution of the change in number of active workers with a job (in the public and private sectors) to real GDP. *** Contribution of the change in real net capital stock to real GDP. **** Contribution of the average number of years of schooling in the population ages 15 and above to real GDP. ***** TFP estimated from equation (4) $\text{Log}(TFP) = \text{Log}(y) - 0.3\text{Log}(k) - 0.07E$ (see Box 4).
Scope: French Polynesia, economy as a whole.
Sources: ISPF, High Commission; authors' calculations and estimates.

negative contributions to growth over multiple years. The comparison with the evolution of TFP in France is enlightening in this regard. While France's TFP almost doubled (+99%) from 1960 to 2006, French Polynesia's TFP increased much less significantly: 64% over the same period, i.e. barely more than in 1960-1965 (+ 59% in 1965 compared with 1960) and less than during the 1987 peak (+ 77% compared with 1960).

France, which remains French Polynesia's leading economic partner, with 27% of its trade in goods and 56% of its current transactions (notably thanks to the large transfers from the State) in 2016, also saw its TPF go off course and stagnate, but only from 2003-2004 (Cette *et al.*, 2017), much later than the Polynesian decline and desynchronization in the early 1990s.

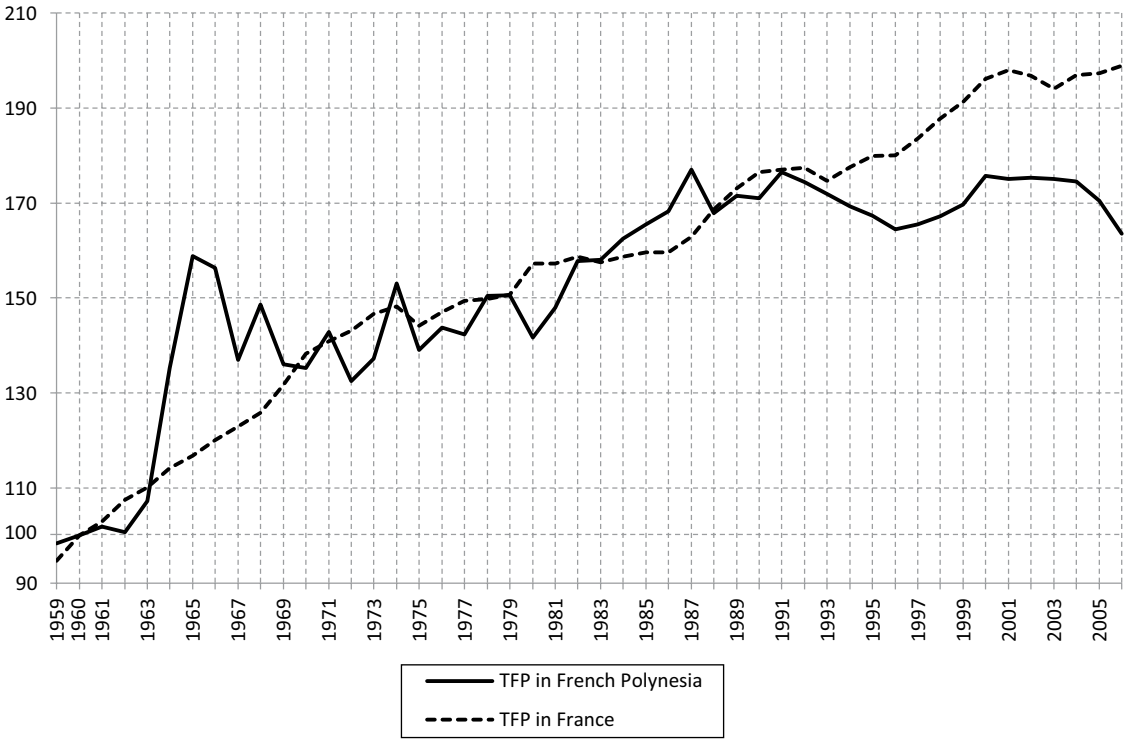
What can be inferred from the weak TFP growth in French Polynesia over the long-term, particularly since the end of the 1980s? Could virtual stagnation or even a negative trend in TFP be inevitable given the territory's geographical, commercial and institutional conditions?

Understanding low total factor productivity in French Polynesia

Total factor productivity is, much like the accumulation of physical and human capital, a direct determinant of growth, but is also an endogenous element. The deeper determinants are geographical conditions, the trade environment and the institutions. To fully understand the evolution of TFP would thus require an in-depth study of its connection with these more fundamental factors. The data available to researchers do not currently enable such work to be carried out. However, some avenues can be suggested here in addition to the comments on the results presented previously.

The question raised bears an analogy with the one discussed abundantly over the past few

Figure VI
Total factor productivity in French Polynesia and France



Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016); authors' estimates based on equation (4) (see Box 4). For France: Insee, Annual National Accounts, 2016 Provisional (2010 basis). Authors' estimation using the same methodology and with the same values for α and r for French Polynesia.

years on the slowdown in total factor productivity and the possibility of a long-term trend toward reduced growth rate, or even stagnation, in the most advanced countries (on this question, see authors such as Gordon, 2015 or Summers, 2015). This discussion pertains mainly to the slowdown in growth observed since the mid-2000s. Various explanations have been offered, in particular, that the returns enabled by existing new technologies have reached an end, due to difficulties in extending their penetration and a slower pace for both innovation and improvement in new technologies. In the case of French Polynesia, our analysis focuses more on the early part of the 1990s.

There is broad consensus that the determinants of productivity growth are linked to incentives for firms and the business environment in which they operate. It is therefore by examining these points that we can attempt to interpret the results found on TFP trends. The interpretation must also take into account the fact that the factors of TFP development at the aggregate level of the economy are more complex than those determining changes at the level of a single company. On an individual scale, the increase in TFP reflects technological progress, while at the aggregate level, TFP can increase as a result of reallocations in resources to the most productive firms or sectors with higher productivity[5]. It is therefore by taking into account these various factors that the empirical results obtained must be assessed.

A considerable similarity between the Polynesian situation and that of neighbouring small island economies, first of all, suggests that some hindrances to productivity directly stem from the geographical and economic conditions of these isolated territories. However, the existence of periods of positive TFP figures suggests that conditions more conducive to an increase in productivity may emerge. The question then remains as to the persistence of phases of low or even negative values, which implies the possible existence of structural problems that go beyond geographical constraints alone.

Obstacles to productivity in small island economies

Like the neighbouring islands of the Pacific and other small territories located far from the world's large market zones, French Polynesia suffers from a foreseeable low-productivity factor syndrome.

Growth accounting studies carried out on several of these small economies (Bhaskara Rao *et al.*, 2007) show (Table 7) that growth is largely linked to the accumulation of production factors and virtually not to changes in TFP, even though the contribution of TFP is rarely measured as being significantly and sustainably negative (see also Faal, 2006).

As emphasised by a World Bank study (World Bank 2009) on world geography and development, the Pacific Islands are hurt concurrently by their small size, geographical isolation, limited access to global markets, fragmentation and enclosure by the sea. Looking at the three criteria "density", "distance" and "division", French Polynesia and the small neighbouring islands of the Pacific rank amongst the world's least favoured, when these three criteria are causes of production difficulties.

In French Polynesia, while most economic activity occurs on the island of Tahiti, the two flagship industries – tourism and pearl culturing – are largely developed in small islands far from Tahiti. Even on the main island, economic density is low, with the base of the activities scattered along a very crowded belt road. The distance to large global markets is on average one of the highest in the world (11,000 km versus an average of 8,100 km for the Caribbean islands, for example). Lastly, the internal geographical divisions are huge due to the fragmentation of islands and archipelagos (several hundred islands on an area equivalent to that of the European continent).

5. This is not automatic and it may happen that reallocations between companies are detrimental to productivity: see Bellone (2017), who refers to the "risk of 'impoverishing' job reallocations".

Table 7
Average annual growth rate (%) of TFP in a few Pacific island countries over the period 1972-2003

Fiji	Solomon Islands	Papua New Guinea	Samoa
0.1	- 0.1	0	0

Source: Bhaskara Rao *et al.* (2007)

These problems of insularity, small size and isolation have significant negative effects on economic efficiency and factor productivity (see in particular Winters & Martins, 2004). These small economies could produce in certain services sectors, in sectors protected from international competition and in those where it is still possible to export at prices that are sufficiently high compared to international competitive levels, for example in certain niche areas of tourism. However, the risk is then that they are limited to sectors of activity characterised by low and stagnant productivity (see Baumol, 1967, as well as all the research that has been carried out since on productivity gains in services).

Despite this challenging geographic and economic environment, phases of positive TFP contribution to growth have been observed over the long-term period under review. A few angles for interpreting these positive periods and the more frequent case of stagnant or even negative results are suggested here.

Factors influencing TFP in French Polynesia

The performance of French Polynesia in terms of TFP reveals periods of positive contribution, averaging at 2.4% per year between 1960 and 1973 or 1.8% per year from 1974 to 1987, then 1.6% per year over 1997-2000. As we saw above, the first period (1960-1987) reflects the high growth rates brought about by the activity of the Pacific Testing Centre. The second period encompasses the initial post-CEP year, a phase of significant expansion of own productive resources for the island, particularly in the tourism, fishing and pearl culturing sectors. The third period is relatively short (4 years) and can be defined as an expansion phase, in part driven by external factors. There is probably, in the increase in TFP during these years, a cyclical dimension, but it is also a period during which major structural changes in the economy took place: the reduction in customs duties and implementation of VAT, the development of large retail stores, and the concentration of the population on the main island (Tahiti). A hypothesis can be put forward as to the positive effects of these structural changes.

The most general results observed around the world regarding factors influencing productivity can be used to put forward some assumptions about the interpretation of TFP in French Polynesia. Obviously, only sufficiently long-term and reliable statistical data at a disaggregated level (individual companies or sectors) would make it possible to confirm or infirm these.

The entrepreneurial dynamic regained during years 1997-2000, though far from that of the CEP period, in itself facilitated the adoption of new technologies or organisational methods, as in the retail distribution sector (in particular via the reallocation of resources from small stores to large retailers[6]) or in the tourist accomodation sector. In addition, three major structural changes, likely to positively influence TFP, occurred during this period: a reduction in protectionism (through the gradual replacement of customs duties with VAT, hence lower rates and, above all, effects generating less distortion on relative prices[7]) with widely-known positive effects on TFP (Grossman & Helpman, 1991a; 1991); growth in public investments in transport and energy infrastructures, known to create an environment conducive to the growth of TFP (Bom & Ligthart, 2014); and densification in the urban zone on the island of Tahiti, a source of productivity gains via scale and agglomeration effects (Glaeser, 2011).

However, over the entire period studied and, more generally speaking, structurally, the Polynesian economy is characterised by a set of economic and institutional conditions generally not favourable to total factor productivity. While the economic literature recognizes that international openness, both for commercial flows and foreign direct investment, the quality of infrastructures, the level of human capital and the quality of the institutions, are factors for an increase in TFP, particularly where the last three are concerned, via the increase in the absorption capacity of the new technologies they generate, French Polynesia has well-documented shortcomings in all these areas.

The Polynesian economy remains highly protectionist, with a tariff protection rate (excluding VAT) of 15.6% on the value of total imports (Poirine & Gay, 2015, p. 134). Foreign investments are subject to government authorisation and are thus too often rejected (as in the case of the Digicel telephone operator in 2012, see Montet

6. For analysis of this point based on experience in the United States, see Foster et al.*, 2006.*
7. The tax burden as a percentage of total imports fell from 42% in 1996 to 23% in 2002 (Poirne & Gay, 2015, p. 153).

& Venayre, 2013). The narrowness of the markets and the isolation in general strengthen the presence of monopolistic or near-monopolistic structures (universal postal service, inter-island air transport operations, port and airport infrastructure management operations, electricity transmission, manufacturing of industrial gases, beer production or asphalt manufacturing) or oligopolies (telecommunications, production of cured meats, wholesale tobacco and drugs manufacturing, lighterage) on most markets (as the merger observation reports from the Polynesian Competition Authority emphasise, 2017). Lastly, the autonomy of French Polynesia has generated an institutional system that gives the local government enormous power when it comes to business, with clearly identified distorting effects[8] on long-term growth conditions (see Poirine, 2011; Venayre, 2011, 2012, 2013).

These elements converge to create structural conditions not conducive to growth in TFP, notably through the risks of poor intra and cross-sector allocations which they generate (see Caselli, 2005; Hsieh & Klenow, 2009, 2010; Klenow & Rodriguez-Clare, 2005; Peters, 2013; or Restuccia & Rogerson, 2008).

In the absence of data on TFP at the level of companies and sectors, it is obviously difficult to explore in greater depth the suggested research avenues in this latter section, in addition to comments on TFP trends (at the macroeconomic level) observed over long-term periods in French Polynesia. It would therefore be premature to derive economic policy recommendations from the data at this stage.

* *
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Based on series of reconstructed data, an analysis of French Polynesia's growth accounting was conducted over the long-term period from 1960 to 2006. It shows that the contribution of TFP to growth was positive and relatively high during the CEP period (from the early 1960s to the end of the 1980s) and for a short period in 1997-2000. In contrast, it was negative in years 1988-1997 and after 2001. Despite negative "natural" factors, such as remoteness and the small size of the economy, low TFP is by no means inevitable in level or as a negative trend in a small, isolated economy like that of French Polynesia.

The general knowledge accumulated on factors likely to play a positive role in the trend in TFP and its contribution to growth on the one hand and the analysis of growth and economic policies implemented in French Polynesia on the other, call for further research on policies aimed at strengthening international openness, fostering competition and developing network infrastructure investments. □

8. The government steps in to grant licenses in a large number of markets (telecommunications, energy, transport), but also to protect companies in place through customs duties, subsidies, etc. The result is a strong incentive for dominant companies to develop close ties with governments, facilitated by the small size of the territory, and incentives for political decision-makers to protect the firms in place.

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APPENDIX 1

ANALYSIS OF THE ROBUSTNESS OF THE TFP ESTIMATION HYPOTHESES REGARDING COEFFICIENTS *α* AND *r*

The estimated TFP is based on equation (3), setting the values of coefficient *α* (share of capital) at 30% and coefficient *r* (marginal effect on real GDP growth rate of an additional year of study E) at 7% based on the estimates of Bergeaud *et al.* (2018; 2016). In order to study its robustness, we estimate the growth rate of this estimator for two values commonly used in parameter *α* (30% and 40%), and two values of parameter *r* (6% and 12%), which match the endpoints in the range of values estimated in the literature (Barro & Lee, 2013), both for French Polynesia and France (including overseas departments).

Gaps in TFP growth rate stemming from the rise in the parameter *α*, from 30% to 40% are similar between the two economies (-0.4 percentage point for French Polynesia and -0.3 percentage points for France), regardless of the value of the parameter *r* over the period 1960-2006. These differences come mainly from the period 1960-1987, characterised by strong growth and high volatility.

The growth differential in TFP between France and French Polynesia, linked to the increase in parameter *α* from 30% of 40%, is less than 0.1 percentage point per year (table A1).

Gaps in the TFP growth rate due to the increase in parameter *r* from 6% to 12% are higher for French Polynesia (-0.5 percentage point) than for France (-0.1 percentage point), regardless of the value of parameter *α* over the total period 1960-2006. These differences are particularly significant for the period 1960-1987 for both economies, but also for the period 2001-2006 for French Polynesia. Nevertheless, the gaps in TFP growth differential between France and French Polynesia, stemming from the increase in parameter *r* from 6% to 12%, are slightly less than 0.4 percentage points per year.

Following this analysis, and even if the setting of the parameters *α* and *r* could be refined through empirical studies on French Polynesia, we consider our TFP estimate to be robust.

Table A1
Estimated PGF* for French Polynesia and France according to different values of *α* and *r*

α (%)	*r* (%)	Annual growth rate (in logarithmic difference)					
		1960-73	1974-87	1988-96	1997-2000	2001-06	1960-2006
French Polynesia							
30	7	2.4	1.8	- 0.3	1.6	- 1.2	1.1
30	6	2.5	1.9	- 0.3	1.6	- 1.1	1.2
40	6	1.5	1.5	- 0.2	1.8	- 1.0	0.8
30	12	2.0	1.4	- 0.4	1.9	- 1.9	0.7
40	12	0.9	1.0	- 0.4	2.2	- 1.9	0.3
France							
30	7	2.9	0.7	0.4	2.1	0.2	1.5
30	6	3.0	0.8	0.4	2.2	0.2	1.5
40	6	2.5	0.4	0.3	2.0	0.1	1.2
30	12	2.9	0.6	0.3	2.0	0.2	1.4
40	12	2.4	0.3	0.3	1.9	0.0	1.1
Growth differential between France and French Polynesia (in percentage points)							
30	7	0.52	- 1.07	0.67	0.49	1.42	0.42
30	6	0.44	- 1.14	0.65	0.57	1.29	0.36
40	6	1.04	- 1.07	0.56	0.20	1.12	0.45
30	12	0.88	- 0.76	0.77	0.10	2.07	0.74
40	12	1.48	- 0.68	0.69	- 0.28	1.90	0.82

Note: * TFP estimated from equation (4) Log(TFP) = Log(*y*) – *α* Log(*k*) – *rE* (see box 4).
Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016), base 2005; authors' estimates. For France: Insee, National accounts, 2016 provisional (2010 base); authors' estimations.

APPENDIX 2

ANALYSIS OF THE ROBUSTNESS OF THE TFP ESTIMATION HYPOTHESES REGARDING CALCULATION OF LEVEL OF EDUCATION *E*

Estimating TFP based on equation (4) as a factor of educational achievement consists, according to the methodology of Barro and Lee (2013), of constructing the average number of years of schooling *E* for the population ages 15 and over, as the average duration of time spent in school to earn a degree, weighted by the percentages of the population having earned these degrees. The classification of diplomas is the same as that used in the International Standard Classification of Education (UNESCO) (2011):

- ISCED Level 0 has no time criterion, a curriculum must amount to at least 2 hours per day and 100 days per year of educational activity to be included;
- ISCED Level 1 has a duration varying from 4 to 7 years, with a median duration of 6 years;
- ISCED Level 2 has a duration of 2 to 5 years, with a median duration of 3 years;
- ISCED Level 1+2 reflects total cumulative duration of 9 years, i.e., the time required to earn a French CEP or a BEPC;
- ISCED Level 3 amounts to 2 to 5 years, with a median duration of 3 years;
- ISCED Level 1+2+3 amounts to total cumulative duration of 12 years, i.e., the time required to earn a French Baccalaureate;
- ISCED Level 4 lasts anywhere from 6 months to 2 or 3 years;
- ISCED Level 5 lasts anywhere from 2 to 3 years;
- ISCED Level 6, which occurs after level 3, varies from 3 to 4 years, and has a total cumulative duration of 15 years, i.e., that required to earn a first-cycle degree ("*licence*", the French Bachelor's degree);
- ISCED Level 7 follows Level 6, varies from 1 to 4 years, and has a total cumulative duration of 17 years, i.e., that required to earn a second cycle degree (Master's degree).

Using data on the State of Higher Education and Research for France and ISPF for French Polynesia, according to the same methodology and the same definition as Barro and Lee, we estimate the respective average lengths of time spent in school during the period 2004-2006, weighting the proportions of the population ages 15 and over, which earned the highest degrees as listed below:

- no degree, with a maximum duration of 5 years (ISCED 0);
- a CEP or BEPC, with cumulative duration of 9 years (ISCED 1+2);
- a CAP or BEP, with cumulative duration of 11 years;
- a Baccalaureate, with cumulative duration of 12 years (ISCED 1+2+3);
- a first-cycle degree, with cumulative duration of 15 years (ISCED 1+2+3+6);
- a second-cycle degree, with cumulative duration of 17 years (ISCED 1+2+3+6+7).

This provides us with the respective values of 12.3 years for France and 9.0 for French Polynesia, i.e. a difference of 3.3 years in 2005 (average for the period 2004-2006). We then calibrate our estimator for French Polynesia to adjust the value estimated above for France to that estimated by Barro and Lee.

In order to study the robustness of the TFP to this calibration, we then estimate the growth rate of this estimator for different values of this difference in the level of education between France and French Polynesia in 2005.

The difference in the TFP growth rate due to the variation in this parameter is relatively low for the different sub-periods, except for the last years 2001-2006, and almost zero over the whole period 1960-2006 (table A2). The estimated TFP estimation appears robust to the calibration.

Table A2
Estimated TFP* for French Polynesia for different values of the gap in the level of *E* (educational attainment) between France and French Polynesia

Difference in *E* (in years) between France and French Polynesia in 2005	1960-73	1974-87	1988-96	1997-2000	2001-06	1960-2006
	Annual TFP growth rate (in logarithmic difference)					
3.3	2.4	1.8	- 0.3	1.6	- 1.2	1.1
2.8	2.3	1.8	- 0.2	1.5	- 1.0	1.1
2.1	2.2	1.7	- 0.2	1.4	- 0.7	1.1
	TFP growth differential between France and French Polynesia (percentage points)					
3.3	0.52	- 1.07	0.67	0.49	1.42	0.42
2.8	0.62	- 1.04	0.62	0.59	1.22	0.42
2.1	0.78	- 0.98	0.56	0.73	0.92	0.42

Note: * TFP estimated from equation (4) $\text{Log}(TFP) = \text{Log}(y) - \alpha\,\text{Log}(k) - rE$, with $\alpha = 0.3$ and $r = 0.07$ (see box 4).
Scope: French Polynesia and France (mainland France and overseas departments, excluding Mayotte), economy as a whole.
Sources: For French Polynesia: database built by the authors based on Insee's economic accounts (1960-1976), ITSTAT (1976-1996), ISPF (1987-2014), and CEROM (2015-2016), base 2005; authors' estimates. For France: Insee, National accounts, 2016 provisional (2010 base); authors' estimations.

Sectoral labour productivity and economic competitiveness in New Caledonia

Serge Rey* and Catherine Ris**

Abstract – A small island economy, New Caledonia stands out amidst other French overseas territories, and even more so the islands of Oceania, for its high standard of living and human development. However, it also suffers from the disadvantages common to small island economies (remoteness, small market size, etc.). The slowdown in growth observed over the last few years reveals how the New Caledonian model of "extensive" growth is losing pace overall: producing more from more of inputs to satisfy the domestic demand, protecting itself from international competition in the process, and drawing largely on nickel mining. This article aims to assess the competitiveness of New Caledonia's economy. It puts forward labour productivity indicators for the main market sectors of the New Caledonian economy from 1992 to 2014 to derive changes in unit costs and finally in real exchange rates. It shows that labour productivity has tended to stagnate since the early 2000s, while at the same time increases in minimum wage contribute to an increase in unit costs and a decline in competitiveness.

JEL Classification: O13, O40, O56
Keywords: New Caledonia, labour productivity, price/cost competitiveness, nickel industry

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New Caledonia experienced a period of very sharp economic growth between the early 1960s and 2010. This prosperity was and remains an exception amongst overseas French territories. The average level of income per capita is high and comparable to that of mainland France (not adjusted for purchasing power parity, PPP)[1]. New Caledonia can also be compared to surrounding areas of the South Pacific, with a level of economic and human development on par with that of New Zealand and significantly higher than that of its other neighbouring island states. However, this prosperity rests in part on fragile foundations. New Caledonia is a small, wealthy but unequal economy[2], where wealth is derived mainly from nickel mining and industry, i.e. a non-renewable natural resource, and from the transfers provided by mainland France. Its economy is therefore dependent on cyclical and non-lasting sources of income, even though it is protected from external shocks by its relatively low degree of openness. Moreover, it struggles with a significant handicap that hampers its long-term growth: the poor competitiveness of the local production system, as this article will bring to light.

According to the study from CEROM (CEROM, 2017, p. 9), different stages of growth can be distinguished over the last five decades. In the 1960s up to the first oil shock, New Caledonia's economy, highly specialised in nickel industry, experienced a surge in growth (average annual rate of 8%); in the following decade, its growth fell to null, in particular due to the end of the nickel boom; then, in the second half of the 1980s, the New Caledonian economy returned to sustained growth, at an average annual rate close to 8%, higher than that of mainland France and other economies in overseas France, while the June 1988 Matignon Agreements brought peace back to the territories. Lastly, since the early 1990s, the New Caledonian economy has experienced steady average growth of around 3%, supported first by investments in the metallurgy sector, and secondly, since the early 2010s, by household consumption and nickel exports.

Historically, growth has been fuelled by massive external transfers – endowment funds from mainland France and foreign direct investment in the nickel sector, particularly for the construction of two new nickel processing plants in the 2000s – as well as by rapidly growing government spending (both in operation and investment). In particular, investment, and more specifically private investment, played a decisive part between 2003 and 2011, culminating in 44% of GDP. Public investment efforts have also been significant: +10.5% on average per year over this period, with a contribution of 4% to 5% of GDP. While the knock-on effects were particularly significant in the construction and business services sectors, private investment by households and companies also benefited from the various tax exemption schemes adopted nationally (instituted in 1986 by the "Pons Act" during the violent events that took place at that time) and locally (instituted since 2002, see Chauchat & Perret, 2006, p. 104) and the low interest rates at the end of the 2000s. Over the same period, salaried employment rose sharply, i.e. +3.9% on annual average. The accumulation of the labour factor combined with the capital factor is characteristic of a period of particularly extensive growth, but one without any real competitiveness imperative, due to the strong protection set up around the domestic market (Wasmer, 2012).

In the same time, New Caledonia lags behind countries with the same level of wealth where education is concerned. While the proportion of higher education graduates has increased in the younger generations, it remains 16 percentage points lower than the OECD average in 2014-2015, 13 percentage points lower than in New Zealand, a gap that is increasing, and 22 percentage points lower than in Australia (Ris *et al.*, 2017). In addition, there are significant disparities between the three provinces (Southern Province, Northern Province and Loyauté Islands), due in particular to the uneven distribution of educational infrastructures. These figures suggest that New Caledonia was not completely spared from the potential "curse of natural resources"[3]; economic history tells us that natural resources are often poorly managed and that countries highly endowed in natural resources prove the poorest in terms of economic and human development (Macartan *et al.*, 2007). Natural resources exploitation often goes hand in hand, first, with under-investment in education and, secondly, with socio-economic inequalities between those who have been able to take hold of the

1. Taking into consideration the particularly high price levels, once GDP is adjusted for PPP, the relative level of GDP per capita is less favourable to New Caledonia.
2. See in particular Ris (2014), on ethnic inequalities in the labour market.
3. New Caledonia ranks 2nd in the world in terms of estimated nickel reserves (11%), after Australia (23%).

natural resources and the others. Since natural resources do not need to be produced, but merely extracted, resources can be mined independently of other economic activities, without externalities for the productive sector. The high incomes generated by the natural resources sector encourage the payment of high wages, which are attractive to unskilled or low-skilled labour. The return on investment in education is therefore low. Another possible explanation for low investment in education across the New Caledonian population lies in the high level of protectionism around its economy[4]. This may well contribute to delaying the increase in the education level by making work in the sheltered sector (demanding unskilled labour) more attractive than in other sectors, thereby reducing the relative return on education.

As emphasised in CEROM (2017) and Ris *et al.* (2017), following the positive shocks from which the New Caledonian economy benefited in the 2000s – a confidence shock following the Nouméa Agreement (1998), an investment shock and a "terms of trade" shock thanks to historically high nickel prices – these same factors had a negative impact from 2012, both because of the slowdown in the growth model and for situational reasons: a phase of large-scale private investments that had likely reached their term; plummeting nickel prices that would not stabilise until 2016-2017, generating significant deficits in three metallurgy plants; significant variations in mining rates due to major technological issues encountered for a few years since, and lastly, institutional uncertainties due to the referendum on self-determination planned in November 2018 (see Box 1). Since the end of 2017, a slight improvement in the economic environment, thanks primarily to the situation in the nickel sector (increase in production, better price trend and effort to control costs) and an increase in household investment in housing form what continues to be a sluggish environment (IEOM, 2016; 2018).

An analysis of the conditions for a return to sustained economic growth in New Caledonia first requires a study of total or global factor productivity, or the productivity of a given factor (AFD, 2016). This second approach has been

4. Bignon and García-Peñalosa (2017) show that the sharp increase in duties in France in 1892 lowered education levels and increased birth rates in departments where the share of employment dedicated to agricultural production was highest. This hypothesis has not been tested for New Caledonia.

Box 1 – **New Caledonia's institutional status**

New Caledonia is unique amongst French overseas territories, with a status defined under Title XIII of the Constitution and implemented by Organic Law No. 99-209 of 19 March 1999. As *sui generis* status, New Caledonia has its own institutions, an unparalleled transfer regime from mainland France, and political autonomy. Registered with the UN on the list of countries to be decolonised, the country's eligible population will vote on 4 November 2018 on the full emancipation of the country by answering the following question: "Do you want New Caledonia to gain full sovereignty and become independent?"

New Caledonia's status is original in that it gives recognition to the Kanak people alongside other French populations looking ahead to the prospective construction of a common destiny, by establishing country citizenship that is destined to become a nationality, and by enabling the operation of quasi-State and parliamentary institutions. The Matignon Agreements in 1988 created three provinces (South Province, Northern Province, and Province of the Loyauté Islands) that share power geographically, while the Nouméa Agreement in 1998 initiated the political sharing of power by establishing a collegial government, elected proportionally to Congress and accountable to it. The Congress votes on "country laws", which are legislative acts equal to national law, directly overseen by the Constitutional Council. The Customary Senate is a second chamber for matters relating to customary civil status, land and identity symbols.

The President of the Government runs the administration, appoints individuals to public jobs, and represents New Caledonia. Since the 1980s, New Caledonia has benefited from progressive and unusual transfers of power, including on labour law, taxation, foreign trade, the regulation of natural resources, the repression of fraud, price regulation, the rules on health and social protection, a move sped up even more by successive political agreements with civil law, commercial law, primary and secondary education, etc. Under the terms of the Nouméa Agreement, following final transfers (status of municipalities, legality control, universities and audio-visual sector), mainland France shall hold powers solely on sovereign matters, defence, justice, police, currency and foreign relations, in which New Caledonia is nonetheless already involved.

favoured here[5]. This is because, first of all, a lasting improvement in labour productivity is a decisive factor for growth. Without reviewing the literature exhaustively, we can see a slowdown in labour productivity growth since the early 1970s, especially in the countries of the European core (Austria, Belgium, France, Germany and the Netherlands), along with a slowdown in GDP growth (Dabla-Norris *et al.*, 2015, p. 7). Secondly, labour productivity combined with wages determine the unit costs and therefore the price/cost competitiveness of an economy, which will also ultimately have an impact on the country's growth, via trade flows (export-driven growth) and/or via services and in particular tourism in small island States.

There is abundant literature on the links between productivity, competitiveness (and sometimes openness) and growth, as well as on the determinants of productivity. For example, Krüger (2008) proposes a literature review focused on the relationship between productivity and technological change, while Bourlès and Cette (2007) conclude that hourly labour productivity increases with the production capacity utilisation rate and the percentage of communication and information technology production in GDP, and declines when the employment rate or the number of hours worked increases. These conclusions can be related with the research carried out by Malinvaud (1973) who showed that hourly labour productivity increased with the reduction in working time, the capital/labour substitution (increase in capital stock and replacement of obsolete capital) and the acceleration of production. Based on microeconomic data covering 7 sectors, Cette *et al.* (2017) analyse the slowdown in productivity (labour productivity and total factor productivity (TFP)) for mainland France and the French overseas departments, and reveal breaks in trends, mainly in the late 1990s and in 2008, but reject the theory of a reduction in the spread of innovation. From a long-term perspective, Lunsford (2017) shows a negative relationship between TFP growth and real interest rates in the United States over the period 1914-2016, but notes that the use of labour productivity led to "quasi-"similar results. Finally, looking at the period 1890-2012, Storesletten *et al.* (2016)[6] measure hourly labour productivity and TFP for 13 advanced countries and show, first, that many breaks have occurred following shocks (wars, financial crises, oil shocks, etc.) and structural policies (Canada and Sweden), and that, secondly, the processes by which new technologies spread are often protracted, which leads them to have some reservations about the impact of the revolution in information and communication technologies (ICT) in the years to come.

The New Caledonian economy: a highly tertiarised productive structure

The economy in New Caledonia is dominated by its tertiary sector. This situation is not new: in the mid-1960s, it already represented a little more than half of nominal GDP (54% versus 52% in metropolitan France) (CEROM, 2005). Since then, this tertiarisation has consistently increased, reaching around 70% of GDP in the late 1990s, which remains comparable to mainland France. The phenomenon appears to have stabilised overall over the last decade (Figure I).

Figure II shows more detailed analysis over twelve sectors of activity over the years 1998-2015. Significant growth can be seen in the construction and business services sectors, which have seen their contributions to GDP increase from 8.6% in 1998 to 11.2% in 2015 and from 5.4% to 8.3%, respectively, due to the major works undertaken in the construction of the two new nickel processing plants as well as to major public construction projects (hospital, airport, social housing).

The other sectors' contributions have been relatively stable, with the exception of the administrations, whose contribution fell in the mid-2000s, before stabilising at around 15% of GDP[7]. At the same time, the proportion of GDP derived from agriculture, the agri-food industry and energy has fallen steadily, from 2.2% in 1998 to 1.4% in 2015, from 2.1% to 1.5% and from 2.4% to 1.4%, respectively.

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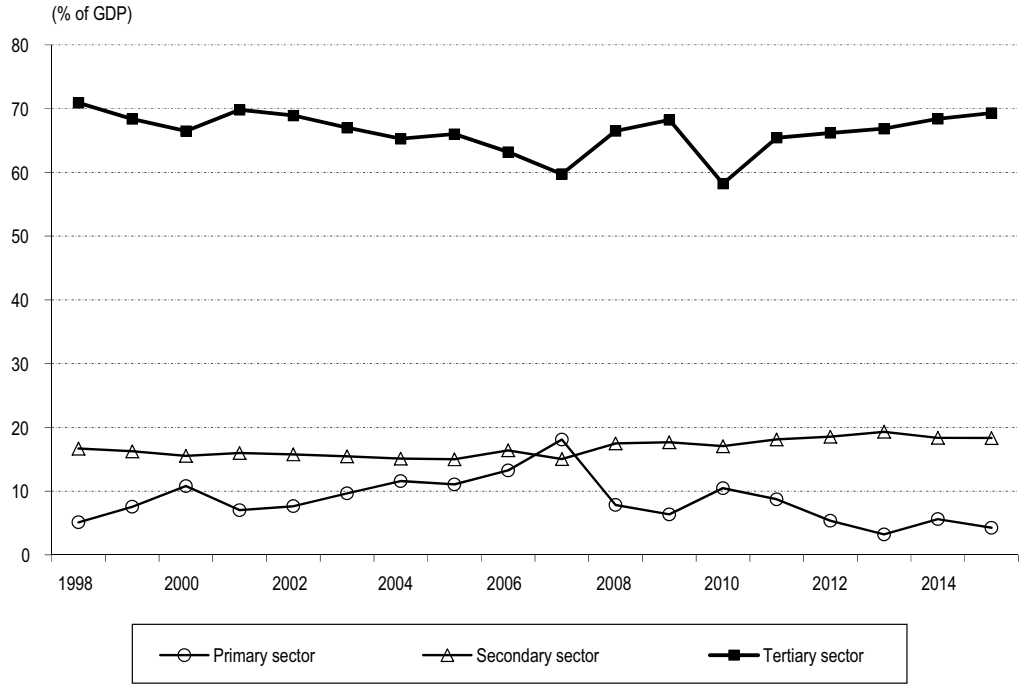
5. Note that total factor productivity has been analysed from three angles: measurement, determinants and effects on growth. Syverson (2011) offers an extensive review of these subjects, while Buccirossi et al. (2013) show that total productivity increases with competition, in 12 OECD countries over the period 1995-2005. De Loecker and Van Biesebroeck (2016) discuss in detail the trade-market power-productivity relationship. As to Bhaskara Rao et al. (2007), they conclude that in the case of small island states (Fiji, Solomon Islands and Papua New Guinea), an accumulation of factors is essential to explain growth while total factor productivity has a negligible effect.

6. Detailed productivity data are provided in the database www.longtermproductivity.com.

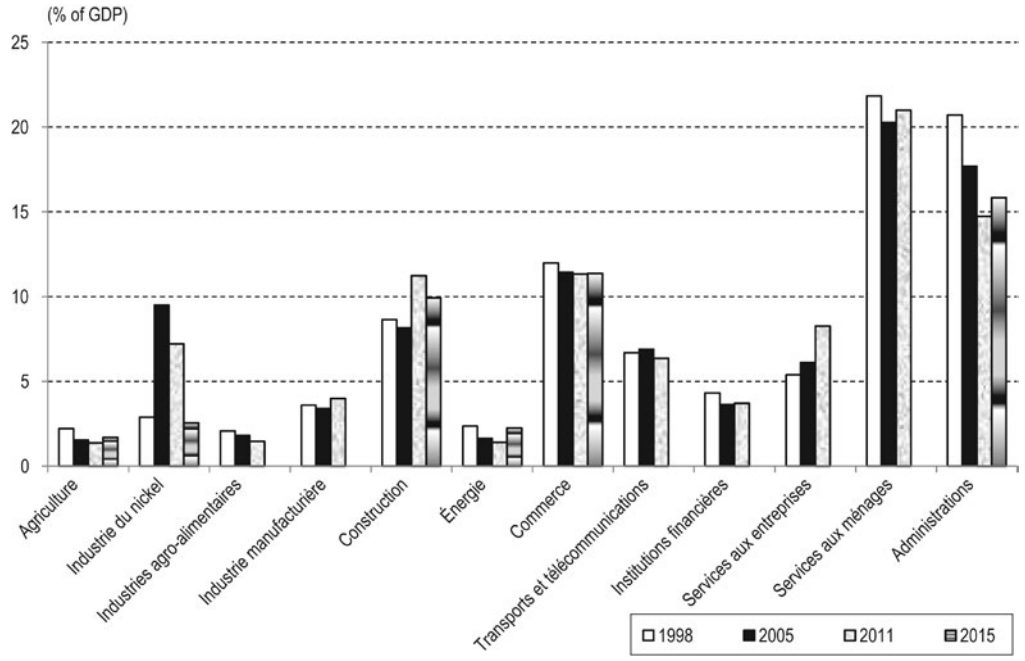
7. The weight of the government sector in GDP is comparable to that seen in mainland France, but lower than that of French Polynesia (which reached more than 32% of GDP in 2013).

Figure I
Trends in the contributions of major sectors of New Caledonian economy



Note: The primary sector includes agriculture, hunting, forestry, fishing, breeding and the nickel industry (mining and metallurgy); the secondary sector includes the agri-food industries, manufacturing industries, energy and construction; the tertiary sector includes trade, transport and telecommunications, financial institutions, services provided mainly to companies, services provided mainly to households, and the administrations. The contribution of each sector is defined by the ratio between value added (in value terms) from the sector and nominal GDP.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec ; authors' calculations.

Figure II
Contributions from different sectors to New Caledonia's GDP



Note: The 2015 data are CEROM estimates and are subject to revision. The contribution of each sector is defined by the ratio between value added (in value terms) from the sector and nominal GDP.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec ; authors' calculations.

The share derived from manufacturing industries (excluding AFIs) remained stable, while that of the nickel sector fluctuated significantly with the global price of minerals. The proportion of GDP derived from the nickel sector shows a long-term downward trend, while fluctuating with the global minerals price (which fell by 30% between 2005 and 2015): from 30% in 1970 to 10% in 1978, then to 3% in 1998, to 9.5% in 2005 and then to 16.8% in 2007, ultimately falling below 3% in 2015.

We are thus seeing a twofold change: on the one hand, a downward trend in the relative weight of the exposed-/free- market sector, defined as the combination of the agricultural sector, the nickel sector and all industries and energy (CEROM, 2005), due primarily to the drop in the contribution of nickel since the end of the 1960s, the time of the "nickel boom"; on the other hand, a surge in the activities protected from international competition (primarily construction and services to companies) (CEROM, 2008 and 2011).

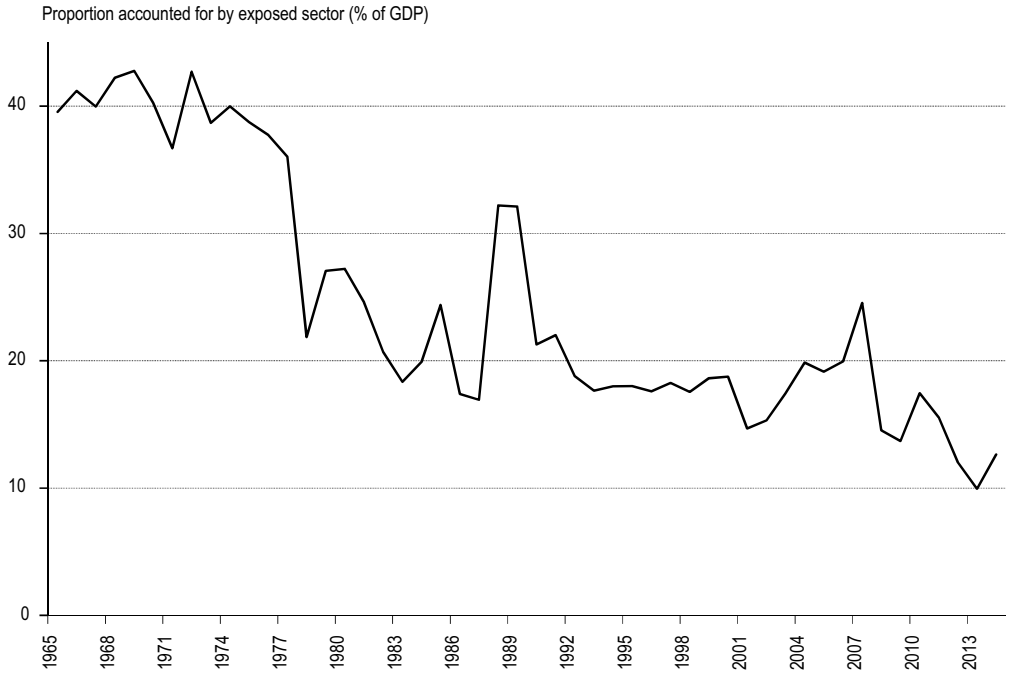
Lower exposure to international competition than in other small island economies

Figure III illustrates the sharp fall in the proportion of the exposed sector (excluding tourism) in the economy between 1965 and 2015. It was halved between the mid-1960s (around 40% of GDP) and the start of the 1980s (around 20% of GDP), stabilising up to the end of the 2000s, and declining again during the 2010s (13% of GDP in 2015[8] (CEROM, 2017, p. 8)).

Over the last twenty years, New Caledonia's economic development has been structured around satisfying domestic demand: its sheltered sector has thus expanded, at the expense of the exposed sector. Moreover, due

8. As the data on value added in tourism-characteristic sectors are not available for years subsequent to 2007, the proportion accounted for by the exposed sector was calculated over the whole period without including its tourism activities. However, according to data available for some years, the weight of these tourism activities can be estimated at around 3% of GDP. It can therefore be considered that, in 2015, the exposed sector accounts for approximately 16% of GDP.

Figure III
Exposure of the New Caledonian economy to international competition



Note: The exposed sector here includes the agricultural sector, the nickel sector, the agri-food industries, energy and manufacturing industries. The proportion accounted for by the exposed sector (as % of GDP) is defined as the sum of the value added from each of these sectors as % of nominal GDP.
Scope: New Caledonia.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec ; authors' calculations.

to the structural impediments faced by New Caledonian companies in a context of small island economies (mainly isolation, remoteness and small size of the domestic market), New Caledonia, which has held powers in the areas of taxation and external trade regulation since the "Statut Stirn" of 1976, has introduced market protection measures[9] and thus extended the scope of economic activities "naturally" protected from international competition. The initial goal was to foster flourishing growth for local companies and job creation. In the agricultural sector, it was also aimed at addressing issues of land use planning and food self-sufficiency.

While this system meets the development constraints of local production in the context of a narrow and fragile market, these measures have had major negative effects: higher price levels and less choice for consumers, a less competitive environment and a lower incentive to achieve productivity gains for local companies (Autorité de la concurrence, 2012). The trend in relative prices (figure A1 of Appendix 1) illustrates this. While the price of nickel relative to services reflects sharp fluctuations in the global minerals price, the long-run decline in the price of manufactured goods relative to services is indicative of the external constraint weighing on the prices of traded goods.

Also, benefiting from significant transfers from mainland France (11% of GDP in 2015), New Caledonia has developed an introverted economy, focusing on satisfying domestic demand while protecting its market, which is little affected by the unpredictability of the international environment, if not through fluctuations in nickel prices. The openness rate of New Caledonia's economy[10] is relatively low, below 30%, compared to the average of 40% observed in small island economies. The proportion of activities exposed to international competition is thus markedly lower than that measured in other small island economies in the South Pacific. For purposes of comparison, according to the World Bank's World Development Indicators, activities exposed to international competition (including only agriculture and the manufacturing sector, i.e. excluding tourism) provided 28% of GDP in Kiribati, 43% in Papua New Guinea and around 33% in Fiji and Tonga. This also reflects the original development models that distinguish these states from New Caledonia. For example, while some have given priority to official transfers and transfers from workers abroad (remittances can account for up to 30% of the GDP of some small Pacific islands such as Tonga, Samoa, Micronesia, Kiribati), which relied on the exploitation of raw materials (Tuvalu, Fiji until the mid-2000s), or tourism (up to 70% of GDP, as is the case of Fiji, the Cook Islands, and Guam), when they have not turned into tax havens (Vanuatu) (Baldacchino & Bertram, 2009).

This observation naturally leads us to look at the performance of the different sectors of the New Caledonian economy in terms of productivity.

Labour productivity stagnating since the early 2000s

In this section, we propose a detailed study of labour productivity, both by sector and for the New Caledonian economy as a whole. Based on the methodology proposed by the OECD (Schreyer & Pilat, 2001), we have constructed an original database containing annual activity indicators (in value and volume) and employment indicators for 8 market sectors over the period 1992-2014. This original database is used first to compute labour productivity indicators by sector of activity, then indicators on unit labour costs and competitiveness.

Labour productivity indicators by sector

At the macroeconomic level, total paid employment has more than doubled in 20 years, increasing from 42,000 jobs in 1995 to 91,000 jobs in 2014 (Figure IV). Between 1995 and 2014, it grew in the private sector by an average of 3.9% per year. At the same time, GDP in current CFP Francs (F. CFP hereafter – that is, the monetary unit based on the former French Franc used in the French Pacific territories)

9. The market protection policy in New Caledonia plays out along two main lines: i) tariff protection through a system of overlapping taxes with around ten specific taxes on competing imports from the New Caledonian industry and a general tax on imports, which the country laws of 2000 reformed and simplified but which remain complex; the average rate of customs tariffs of New Caledonia is 18.6%, compared to 4% in Australia and New Zealand and 6% in the European Union; a reform of indirect taxation, during the pre-commercial launch stage since April 2017 and which was expected to come into effect on 1st July 2018, aimed at replacing some of these import taxes with the General Consumption Tax (equivalent to VAT), ii) certain manufactured or agricultural products are subject to quantitative restrictions (suspension or extension).

10. Defined as [(Exports of goods +Imports of goods) / 2 x GDP]; the variables being expressed in value terms (CEROM, 2017, p.9).

nearly tripled, increasing from F. CFP 329 billion in 1995 to 955 billion in 2014, while in constant F. CFP 1995, the increase was slightly more than 70% over the period.

However, this overall performance level does not adequately reflect disparities between sectors. The labour productivity (productivity per capita) indicator shown by sector over the period 1992-2014 establishes a ratio between an activity indicator and the number of salaried jobs. Only salaried workers were included because of the lack of other data. It can be substantiated insofar as this study focuses on trends in productivity (and not in actual productivity levels) when salaried employment follows a trend similar to total employment[11]. Moreover, due to the lack of information on the number of hours worked in all the sectors considered and the period analysed, the hourly productivity could not be calculated[12].

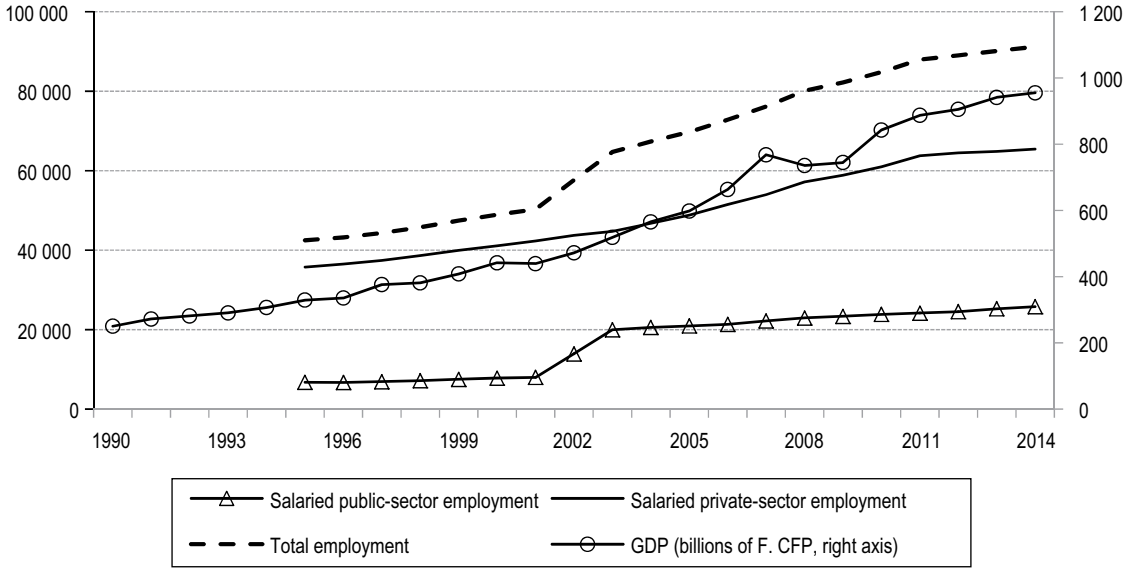
As to the activity indicator, whenever possible, two calculation methods were used. The first is based on value added data (VA), stated in real terms after being deflated by a price index; Table A2-2 of Appendix 2 specifies the choice of price indices. The second calculation method is more direct since it is based on the quantities produced (in units). Since some series of value added have not been complete since the early 1990s, Year 2000 is chosen as a reference year in comparisons between sectors over the period 1998-2014, for which all data are available for all the variables. Data on VA are available for seven sectors of activity: agriculture, the nickel industry (which includes mining and metallurgical production), manufacturing industry (including the agri-food industry[13]), construction, transport and telecommunications, energy and trade. However, no information is available over the period studied on VA for tourism specific activities (Table A2-1 in Appendix 2).

11. According to population census data for 2014 (ISEE, 2014), the working population is 112,103 individuals, 85% of whom are employees. Non-salaried employment (self-employed professionals and craftsmen, merchants, industrials, self-employed workers) accounts for 4% (agriculture) to 30% (construction) of employment depending on sector (the census data making it possible to distinguish between 5 sectors of activity). According to the available data, the share of non-salaried employment has remained relatively stable over the period, especially since the 2000s (14% in the early 2000s).

12. The statistics on full-time equivalent jobs are not extensive enough for us to take into consideration the development of part-time work in certain sectors.

13. While it is possible to identify the value added of agri-food industries (AFIs), when it comes to the manufacturing industry as a whole, including AFIs, only the salaried job data are available, hence the decision to calculate a single productivity indicator aggregating all these sectors.

Figure IV
Trends in employment and GDP in New Caledonia



Unit: Number of salaried jobs (left axis), GDP in billions F. CFP (right axis).
Scope: New Caledonia.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec; CAFAT (Social Security Fund of New Caledonia); RIDET (Company and Establishment Identification Directory); authors' calculations.

For agriculture, nickel industry and transport[14], we have two productivity measures. In the other sectors, in particular energy and construction, as the scopes for calculating value added and the quantities produced are not similar, the comparisons cannot be adequately made. For instance, power generation, which covers only part of the energy sector, has the characteristic of being highly correlated to metallurgical activity. Similarly, the statistics on housing construction cover only part of the activity in the sector. Lastly, as to tourism specific activities, our activity indicator is the number of tourist-days, i.e. the number of tourists (excluding cruise passengers) by country of origin multiplied by the average length of stays. While tourists stay in New Caledonia for an average of 19 days, the length of stays varies significantly depending on nationality. French people from the mainland, who accounted for 32.6% of tourists in 2015 (37,245 out of 113,951) remain on average for 31 days, Australians, who make up 18.4% of tourists come for 10 days, and the Japanese, who form the third largest tourist stream, at 17.6%, stay in New Caledonia for an average of one week. Lastly, New Zealanders, who accounted for 7.5% of tourists in 2015, show stay lengths comparable to those of Australians.

Therefore, before showing these results, it is important to keep in mind the limits to these calculations, mainly due to data availability. First, the decision to use the deflator for each of the sectors (see Appendix 2, Tables A2-1 and A2-2) is not entirely satisfactory. In some cases, it causes consumer price indices to be used rather than producer prices, and in others, makes it necessary to recalculate unit value indices. Furthermore, the value added calculation scope may differ slightly from that of the deflators. Lastly, these problems can be combined when comparing the two productivity indicators. For these reasons, our comments focus on the productivity dynamics (indices) rather than on the levels. Without claiming to completely eliminate the calculation bias, we aim to offer an overview of sector performances in New Caledonia economy over the last three decades.

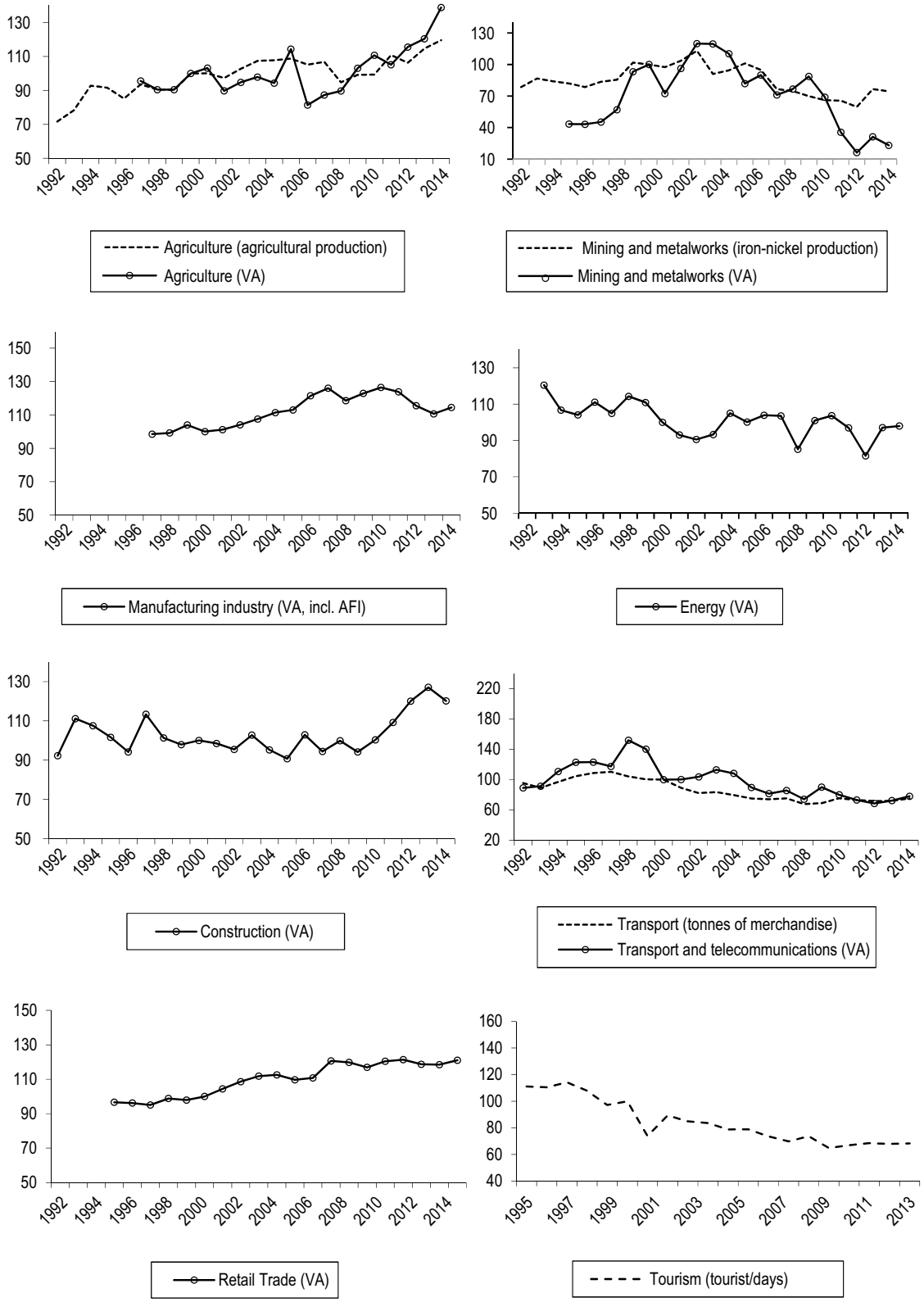
Figure V shows divergences in the trend in labour productivity indicators between sectors. Four sectors have seen their productivity grow since the 1990s; agriculture, construction, manufacturing industry (including AFIs) and trade, while the nickel, energy and transport sectors have seen a downturn in their productivity. In the case of agriculture, Table 1 shows annual productivity gains of 1.5% to 1.8%, depending on the indicator used (with, over the same period, a correlation coefficient of 0.67 between the two indicators, see Table A2-2 in Appendix 2). In industry, results are mixed. Productivity improved in the manufacturing industry (including AFIs) (+0.9% per year on average), but decreased in the nickel sector, where productivity indicators showed a fall (on average -0.5% and -2.3% per year depending on the indicator, with a correlation of 0.72 between the two indicators). However, two phases can be distinguished: an increase until 2003 and a subsequent downward trend, that reflects primarily the decline in activity in the sector in the 2000s (CEROM, 2015). While this fall was partly offset by a rise in global nickel prices, which in turn caused an increase in apparent nominal productivity until 2007 (Figure VI), the subsequent fall in prices had the opposite effects on nominal productivity, all the more so as " *the sector's workforce experienced swift growth (average annual growth of 5% between 2003 and 2012)* (CEROM, 2015, p. 14).

In the construction and trade sectors, labour productivity grew by respectively +1.1% and +1.3% per year on average. Inversely, labour productivity declined by nearly 1% per year in the energy sector. The two productivity indicators in the transport sector show converging results, i.e. annual declines of -4.1% and -2.0% on average (with a correlation of 0.75 between the two indicators).

Lastly, for the activities characteristic of tourism, while caution is still recommended in interpreting these results, the decline in productivity can be seen continuously over the period (-2.8% per year on average). This fall in productivity can be tied back to a move upmarket in accommodation offering, with 3 and 4-star hotels, which require more jobs per customer, gradually replacing lower-range hotels: Figure VII confirms a significant upward trend in stays in hotels with 3 stars or more in Nouméa since the early 1990s, at the expense of 1- and 2-star hotels.

14. See Table A2-1 in Appendix 2 for more information on how activity and productivity indicators are calculated in transport and transport and telecommunications).

Figure V
Productivity indicators by sector in New Caledonia



Note: For each sector, the activity variables selected to calculate labour productivity are shown. VA refers to the sector's VA, stated in real terms, otherwise production (in quantity) is used. For further details, refer to Annex 2. Productivity indicators are provided as indices, base 100 in 2000.
Scope: agriculture, mining and metallurgy, manufacturing industry (including AFIs), energy, construction, transport and telecommunications, trade and tourism sectors; New Caledonia.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec ; authors' calculations.

Table 1 rounds out this overview and provides the average annual growth rates of the three labour productivity indicators: weighted average productivity (PM7) of a market composed of seven sectors (agriculture, manufacturing industries including AFIs, nickel industry, construction, energy, trade, and transport and telecommunications), weighted average productivity excluding the nickel industry (PMHN) and the productivity of the New

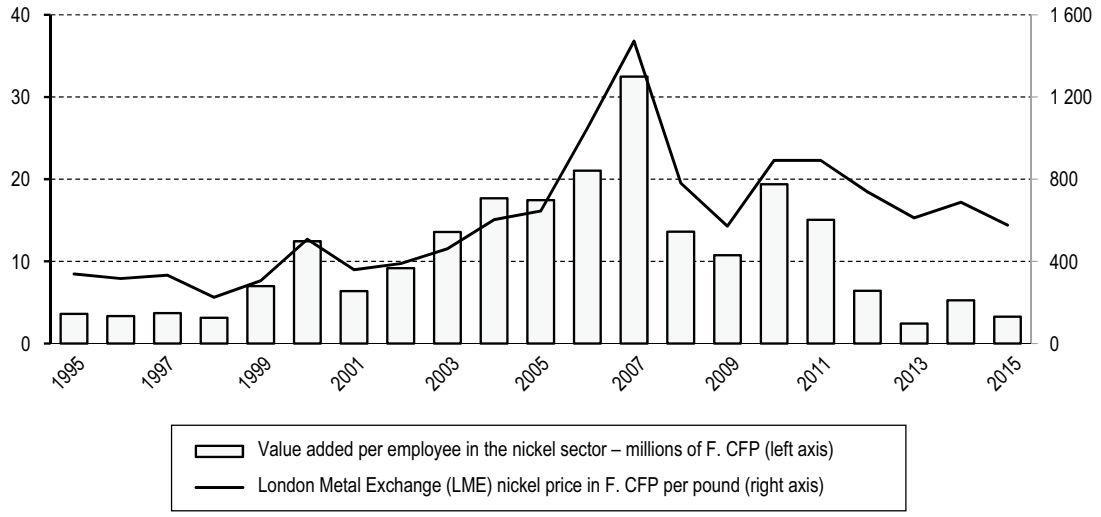
Table 1
Average annual growth rate in labour productivity by sector in New Caledonia, 1998-2014 (in %)

%

Sector	VA in volume terms	Quantities produced
Agriculture	+ 1.8	+ 1.5
Nickel	– 2.3	– 0.5
Manufacturing industries (including AFIs)	+ 0.9	ND
Construction	+ 1.1	ND
Energy	– 1.0	ND
Trade	+ 1.3	ND
Transport and Telecoms	– 4.1	– 2.0
Tourism	ND	– 2.8
PM7	– 0.4	
PMHN	+ 0.1	
Productivity for the New Caledonian economy as a whole (PM)	– 0.2	

Note: The average annual growth rate (*ag*) is calculated using the formula $ag = \left[(a_n / a_0)^{1/n} - 1 \right] \times 100$, where a_n and a_0 are the productivity levels at the start and end of the period. PM7 (resp. PMHN) refers to the weighted average productivity calculated on the seven branches considered (including – resp. excluding – the nickel branch); the weighting of each branch is equal to the share of VA (in volume terms) of the branch considered in all VAs (in volume terms) of the branches considered. The productivity of the economy as a whole (PM) is measured by the ratio of GDP in constant f. CFP and total salaried employment.
Scope: New Caledonia.
Sources : Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides d'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec ; authors' calculations.

Figure VI
Apparent labour productivity in the nickel sector and nickel prices



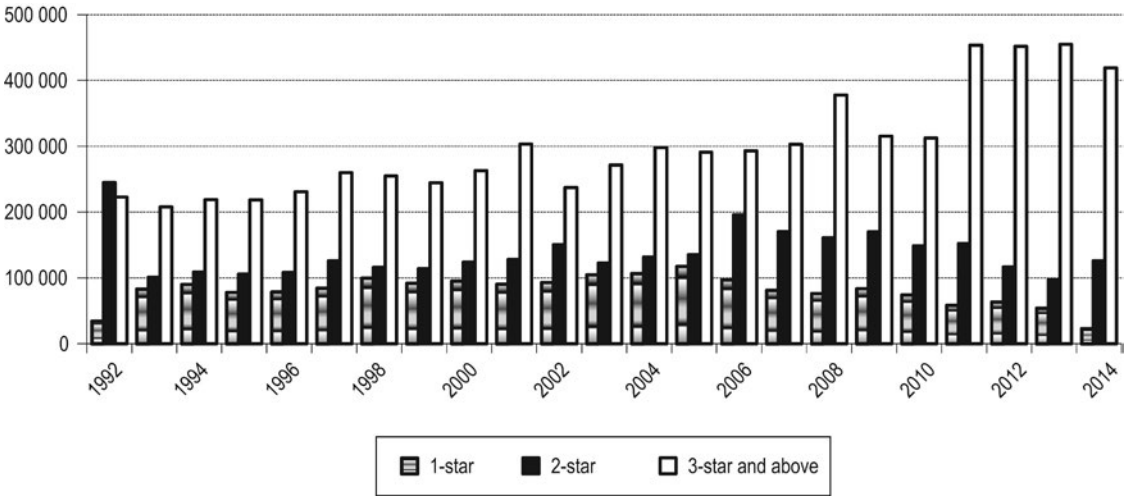
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec; authors' calculations.

Caledonian economy as a whole (PM, measured by the ratio between GDP in volume terms and total salaried employment). The seven-sectors weighted average productivity (PM7) shows a decline of -0.4% per year over the period 1998-2014, consistent with the trend in labour productivity over the economy as a whole (-0.2% per year). In contrast, when the nickel industry is left out, PMHN rises very slightly at an average annual rate of +0.1%.

Figure VIII shows trends in aggregate labour productivity indicators. While at the beginning of the period, the changes in PM7 and PMHN were very similar, a divergence emerged in the mid-2000s, reflecting the poor performance of the nickel industry. The trend in PM, the productivity of the New Caledonian economy as a whole, although more evenly spread, results in the same outcome, with a deterioration in performance for the New Caledonian economy.

If, compared with mainland France, New Caledonia's economic performance appears relatively weak, it appears the same way compared to various island states in the South Pacific, which are its trading partners and/or competitors in certain sectors (Table 2). Three of the neighbouring countries,

Figure VII
Guest numbers at Nouméa hotels by category



Unit: Overnight stays
Source: ISEE, Hotel Survey, 1992-2014.

Table 2
Average annual growth rate in labour productivity in France and in the South Pacific countries 1998-2014

(%)

Mainland France	Australia	New Zealand	Fiji	Kiribati ᵠ	Samoa ᵠ	Papua.ᵠ N. Guin.	Salomon ᵠ Islands	Tonga ᵠ	French Polynesia
Real GDP per employed person									
+ 0.8	+ 1.3	+ 1.0	+ 1.4	– 0.6	+ 2.0	+ 1.4	– 0.4	+ 1.2	– 0.3
Real GDP per hour worked									
+ 1.1	+ 1.4	+ 1.3							

Notes : ᵠ Real GDP per capita.
Scope: Mainland France, New Caledonia and South Pacific countries.
Source: GDP in volume taken from *World Development Indicators*, World Bank. Concerning job data: for French Polynesia, we used the salaried jobs derived from the annual economic accounts published by the Institute of Statistics of French Polynesia ; for Australia, Fiji and New Zealand, the statistics used are those on employed persons from the *Penn Word Trade* 9.0 database; for France, we referred to Insee data. To calculate hourly productivity, data on the number of hours worked comes from the OECD database, https://data.oecd.org/emp/hours-worked.htm.

Australia[15], New Zealand and Fiji experienced increasing labour productivity of at least 1% per year in 1998-2014, sometimes even more, when measured in hourly productivity. In addition, comparisons by sector between New Caledonia and New Zealand can be made based on estimates made by the New Zealand statistics office[16] (2018) over the period 1996-2017. Even though the dynamics are less visible, the indicators on labour productivity tend to vary in the same way in the various sectors (+2.2% in agriculture, -0.2% in the mining sector, +1.3% in the manufacturing industry, -0.3% in energy and +1.2% in construction).

As to the other island states, due to lack of data on employment, we have used GDP per capita trends as our reference. Two countries saw their GDP per capita decline (Kiribati and the Solomon Islands), while Tonga, Papua New Guinea and Samoa experienced increases between 1% and 2% per year. Lastly, French Polynesia, another French territory, experienced a decline in labour productivity, like New Caledonia (see also Dropsy & Montet, 2018, in this issue).

Increase in wages and unit costs in the various sectors

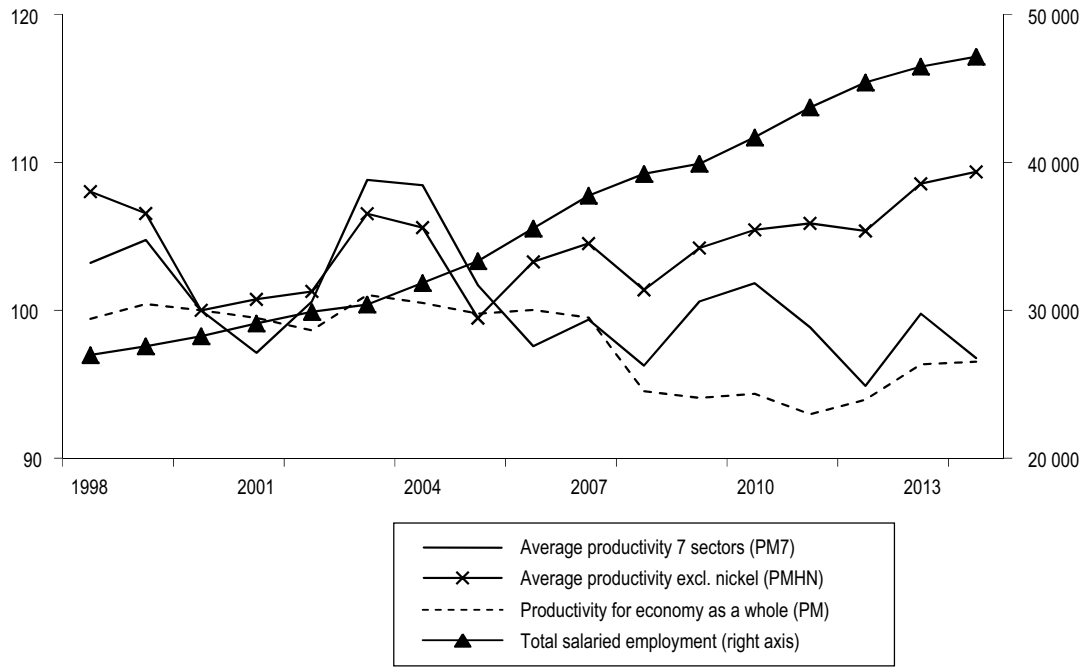
To calculate the unit labour cost per sector, which is a ratio between per capita wage and productivity, we use the minimum guaranteed wage (SMG, created in 1985[17]). Using

15. See D'Arcy and Gustafsson (2012) for a detailed analysis of productivity in Australia. They estimate an average annual gain in labour productivity in Australian industry, amounting to +1.4% between 2003 and 2011. Another useful reference is the New Zealand Treasury's study (2008), for long-term comparisons between productivity in Australia and New Zealand.

16. Productivity statistics: 1978-2017, https://www.stats.govt.nz/.

17. In January 2001, the guaranteed minimum agricultural wage (SMAG) came into being. While it is lower in level, the trend it has experienced is nonetheless similar to that of the SMG. The SMG will therefore be used hereafter to measure trends on unit costs in the agricultural sector. The SMG amounted to F. CFP 132,000 in 2010, and has been equal to F. CFP 155,696 (€1,304) since 1st August 2017.

Figure VIII
Trend in average labour productivity and employment in New Caledonia, 1998-2014



Note: Productivity levels in indices base 100 in 2000. PM7 refers to the average weighted labour productivity of agriculture, the manufacturing industry (including AFIs) and the nickel, energy, trade, transport and telecommunications sectors. PMHN refers to the weighted average labour productivity excluding nickel sector. The weighting of each branch is equal to the proportion of VA (in volume terms) accounted for by the sector in question out of total VAs (in volume terms) of the sectors considered. The productivity of the economy as a whole (PM) is measured by the ratio of GDP in constant F.CFP and total salaried employment.
Scope: New Caledonia.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec; authors' calculations.

the SMG instead of the salary puts a limit on our calculations. Nevertheless, this can be justified because a significant proportion of the employed labour force is poorly qualified and receives relatively low wages, so that SMG increases have a wide impact across the wage scale. Two phases clearly stand out: from 1992 to 2001, the trend in SMG followed that of inflation, whereas from 2002, real SMG (deflated either by the GDP price index or by the consumer price index) increased regularly following the implementation of a policy aimed at revising wages and fighting "the high cost of living" (Figure IX).

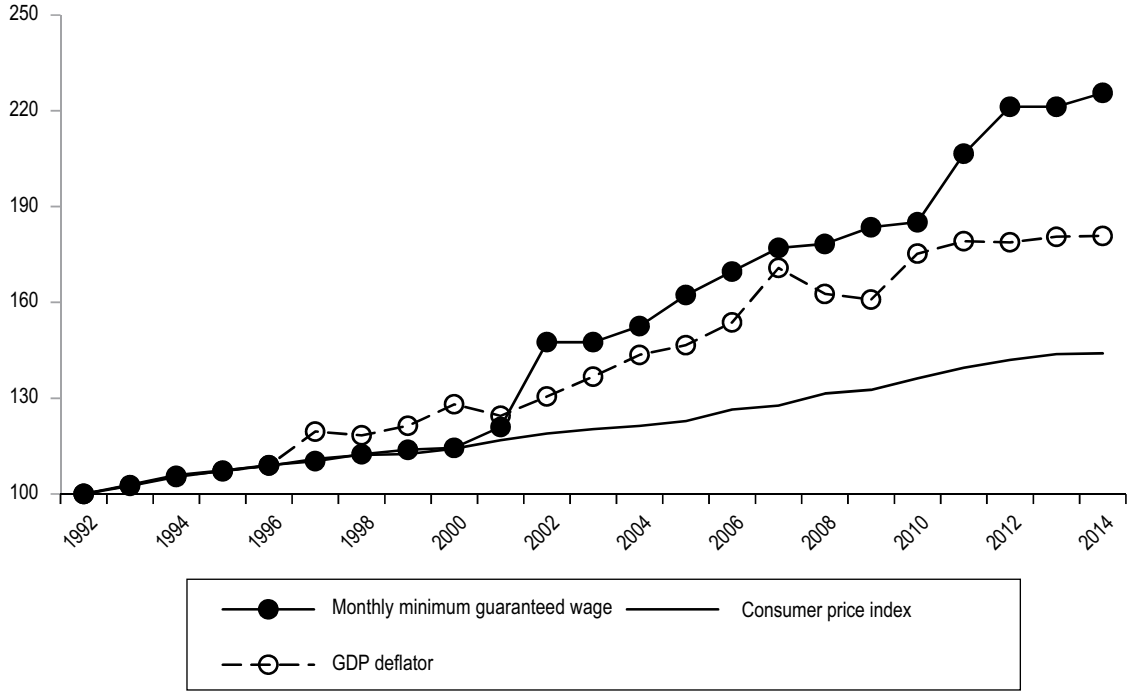
Figure X shows very sharp increases in unit costs over the period, both in sectors exposed to competition – agriculture, nickel, the manufacturing industry (including AFIs), energy and tourism-related activities – and in sheltered sectors – transport and telecommunications and trade. These increases amount to over 200% in two sub-sections of the tertiary sector, transport and telecommunications, and tourism, and around 100% to 150% in the primary sector. Lastly, it is in the secondary sector that the increases were the most limited, at around 60% over the period.

In this context, a sharp rise in average unit costs (weighted by value added) can be observed, calculated on the basis of the guaranteed minimum wage for the market sector considered in 7 sectors, as well as for the economy as a whole, excluding the nickel sector. Moreover, from the mid-2000s forward, unit costs for the economy as a whole increased more slowly excluding nickel than including nickel, reflecting the deterioration in performance levels of the nickel sector shown in the productivity calculations.

A decline in competitiveness since the early 2000s

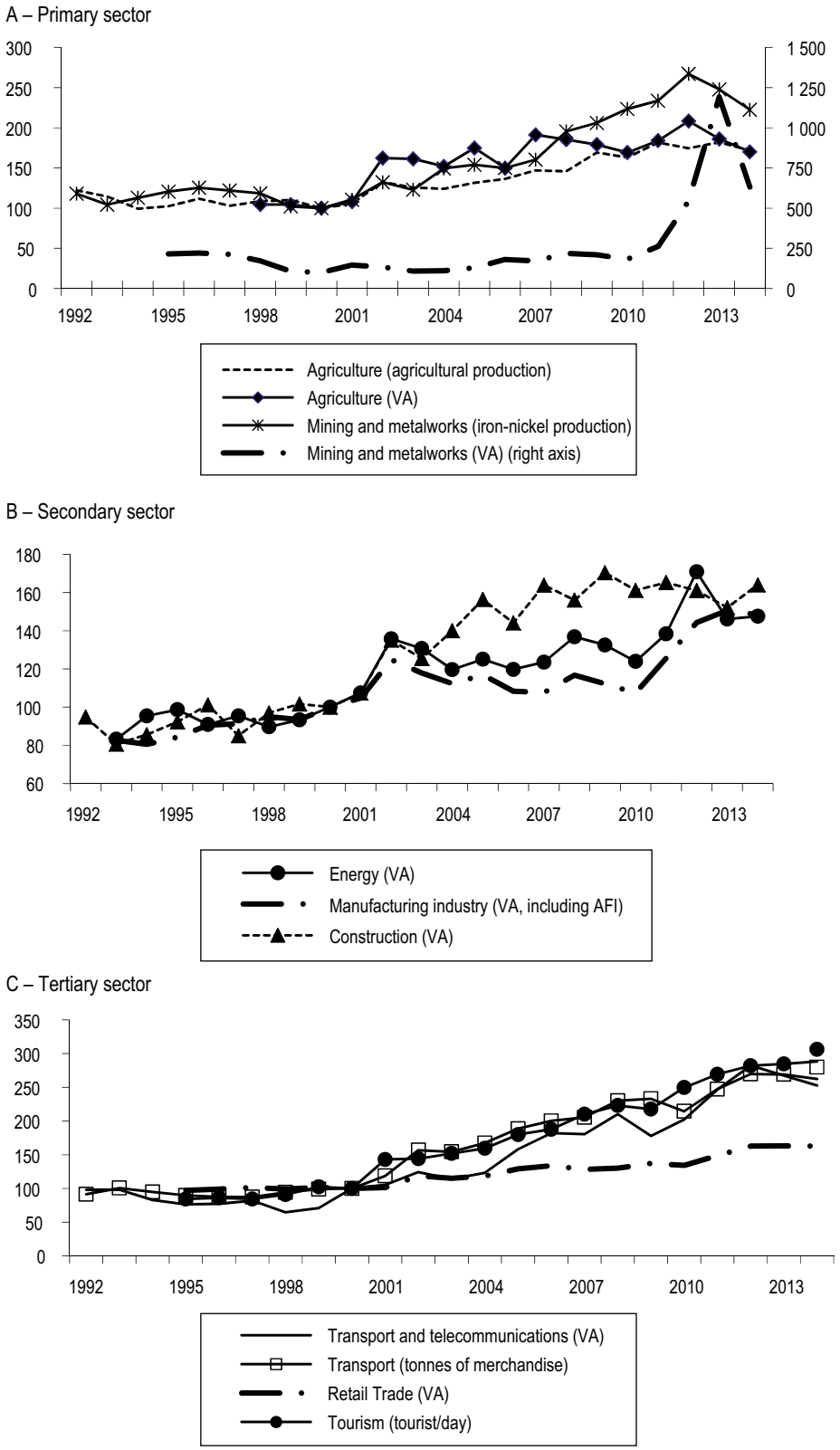
New Caledonia's competitiveness compared to that of various partner economies, whether these be important supplier countries and countries that are the main buyers of Caledonia products or key countries for the tourism sector, such as mainland France (1st trade

Figure IX
Price indexes and Guaranteed Minimum Salary trends in New Caledonia



Note: Wages and price indices base 100 in 1992.
Scope: New Caledonia.
Sources: ISEE : http://www.isee.nc/; authors' calculations.

Figure X
Change in unit costs in New Caledonia



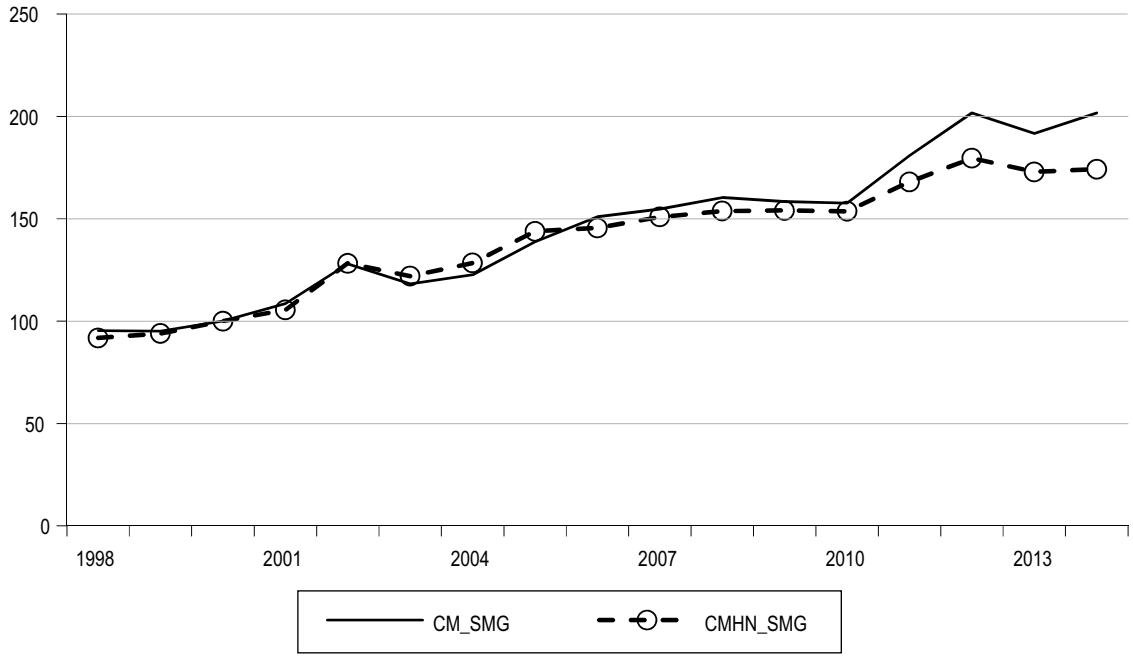
Note: Unit costs are expressed are stated in index terms, with a base of 100 in 2000. The unit cost is calculated as the ratio between the guaranteed minimum wage (SMG) and labour productivity of the sector in question. The primary sector includes agriculture, hunting, forestry, fishing, breeding and the nickel industry (mining and metallurgy); the secondary sector includes the agri-food industries, manufacturing industries, energy and construction; the tertiary sector includes trade, transport and telecommunications, financial institutions, services provided mainly to companies, services provided mainly to households, and the administrations.
Scope: New Caledonia.
Sources: ISEE (http://www.isee.nc/); authors' calculations.

partner), Australia (4th partner), Korea (5th trade partner), Japan (6th partner), the United States (8th partner), New Zealand (11th partner) or Vanuatu (the main competitor for tourism in the Pacific Ocean), is studied here based on real exchange rates.

For each pair of countries, three real exchange rate indicators are calculated (see Box 2). The first is based on the GDP deflators for New Caledonia and the competing country. This is the broadest definition of the real exchange rate (expressed as *R_def*) which has the advantage of giving priority to goods and services produced "domestically". Taking into account consumer prices would not be relevant given New Caledonia's high dependency on certain imports. Nevertheless, given the highly protected nature of the New Caledonian economy, we have selected a second indicator in which the respective deflators of New Caledonia and partner countries are replaced by the corresponding average unit costs of the manufacturing industry. This second measurement (expressed as *R_cumanuf*) is more restrictive but offers a better representation of the situation of the exposed sector. Lastly, even though the scopes of unit cost calculations are not entirely identical, a third measure of real exchange rates is proposed (noted *R_cm*) taking into account the average unit cost for New Caledonia and the unit cost of the manufacturing sector for competing countries, assuming that the average cost in New Caledonia is a better proxy for the cost of the exposed sector than the sole cost of the manufacturing sector.

Two points can be made from an examination of Figure XII. First of all, the competitiveness indicators (whatever the indicator used) are rather stable over the whole period compared to Australia, New Zealand and Vanuatu. Conversely, a sharp real appreciation can be seen from the early 2000s compared with Japan, South Korea, the United States and mainland France. However, while this loss of competitiveness mainly reflects the appreciation in nominal exchange rate up to the late 2000s, it is the faster rise in prices and/or unit costs that is the main cause for this trend in the other partner countries. Furthermore, from the comparison of the three indicators, it emerges that competitiveness losses (real appreciation) are always larger when looking at the unit costs of the market sector rather than the GDP deflator.

Figure XI
Average unit costs trends across all sectors in New Caledonia



Note: Average unit costs in indices, base 100 in 2000. CM_SMG refers to the weighted average unit cost of the market economy (with 7 sectors); CMHN_SMG the weighted average unit cost excluding the nickel industry.
Sources: ISEE (http://www.isee.nc/); authors' calculations.

Lastly, the F. CFP anchored to the Euro[18], and thus to the trend in bilateral nominal exchange rates, obviously has an impact on the dynamics of real exchange rates, especially in the short term. Nevertheless, the analysis highlights a loss of structural competitiveness in New Caledonia, especially compared with mainland France and Japan.

Lastly, the loss of competitiveness did not come alongside an increase in the Caledonian market penetration. Import penetration rates by branch remained relatively constant over the period 1998-2011, with the exception of energy, which increased sharply. Moreover, these rates differ sharply; they are very low for agriculture and transport, and higher for energy and industry (Figure XIII). These conclusions are not surprising in view of the economic strategy followed in the territory. When New Caledonian companies are unable to substitute goods for imports, penetration rates are very high. This is the case, for example, with capital goods with a penetration rate of 93.2% in 2011[19]. Conversely, when the possibility of competing with imported goods exists, as in agriculture and the AFIs, the New Caledonian government implements various protectionist measures to limit domestic market penetration (CEROM, 2011 p. 16, and footnote n° 9).

18. Fixed rate, with parity of 1 euro = 119.33 F. CFP.
19. The rate exceeded 96% in 1998.

Box 2 – **The relationship between unit costs and competitiveness**

Unit labour costs (*CU*) are defined as the ratio between the wage rate and labour productivity. It is decisive in the price-setting process. For instance, n indicator of price and/or cost competitiveness between two trading partners can be defined either as the price or real exchange rate ratio between the two countries, or as the ratio of unit costs between the two countries, expressed in common currency.

Consider the relative price or bilateral real exchange rate between New Caledonia ($R^{nc/i}$) (superscript *nc*) and a partner country (superscript *i*). The bilateral real exchange rate will be stated as:

$$R_t^{nc/i} = \frac{N_t^{nc/i} \cdot P_t^{nc}}{P_t^i} \quad (1)$$

where $N_t^{nc/i}$ is the nominal exchange rate, *P* the price of goods and services. An increase in *N* (respectively *R*) is equivalent to a nominal (respectively real) appreciation of the currency, consequently a loss of competitiveness for New Caledonia.

To express this real exchange rate in terms of unit costs, we can use the competition hypothesis and the consistency of returns to scale, i.e. equality between the price and the average unit cost ($p=w/a$), where *w* is the wage rate and *a* labour productivity[(a)]. Assuming that the New Caledonia economy can be "broken down" into an exposed sector (tradable goods, expressed as *e*) international competition accounting for θ, and a sheltered sector (non-tradable goods, expressed as *ne*) accounting for 1 – θ, the general price level can be written[(b)] $P^{nc} = \left[P_e^{nc}\right]^{\theta}\left[P_{ne}^{nc}\right]^{1-\theta}$. The real exchange rate becomes

$$R_t^{nc/i} = \frac{N_t^{nc/i} \cdot \left[P_{e,t}^{nc}\right]^{\theta}\left[P_{ne,t}^{nc}\right]^{1-\theta}}{\left[P_{e,t}^{i}\right]^{\theta}\left[P_{ne,t}^{i}\right]^{1-\theta}} = \left[\frac{N_t^{nc/i} \cdot \left(w_{e,t}^{nc} / a_{e,t}^{nc}\right)}{\left(w_{e,t}^{i} / a_{e,t}^{i}\right)}\right]^{\theta} \cdot \left[\frac{N_t^{nc/i} \cdot \left(w_{ne,t}^{nc} / a_{ne,t}^{nc}\right)}{\left(w_{ne,t}^{i} / a_{ne,t}^{i}\right)}\right]^{1-\theta} \quad (2)$$

The first right-hand term in the equation denotes the relative unit costs of the exposed sector (expressed as $Rcu_e^{nc/i}$), while the second term shows the relative unit costs of the non-traded goods sector (expressed as $Rcu_{ne}^{nc/i}$). These relative costs stated in common currency can be considered as real exchange rates defined in terms of unit costs. Equation (2) can thus be re-stated as follows:

$$R_t^{nc/i} = \left[Rcu_{e,t}^{nc/i}\right]^{\theta}\left[Rcu_{ne,t}^{nc/i}\right]^{1-\theta} \quad (3)$$

The ratio of unit costs stated in common currency between two countries will provide a measure of cost competitiveness that can also be considered as a real exchange rate (*R*). In change terms, the relationship becomes:

$$\dot{R}_t^{nc/i} = \theta \cdot \left[\dot{R}cu_{e,t}^{nc/i}\right] + (1-\theta) \cdot \left[\dot{R}cu_{ne,t}^{nc/i}\right] \quad (4)$$

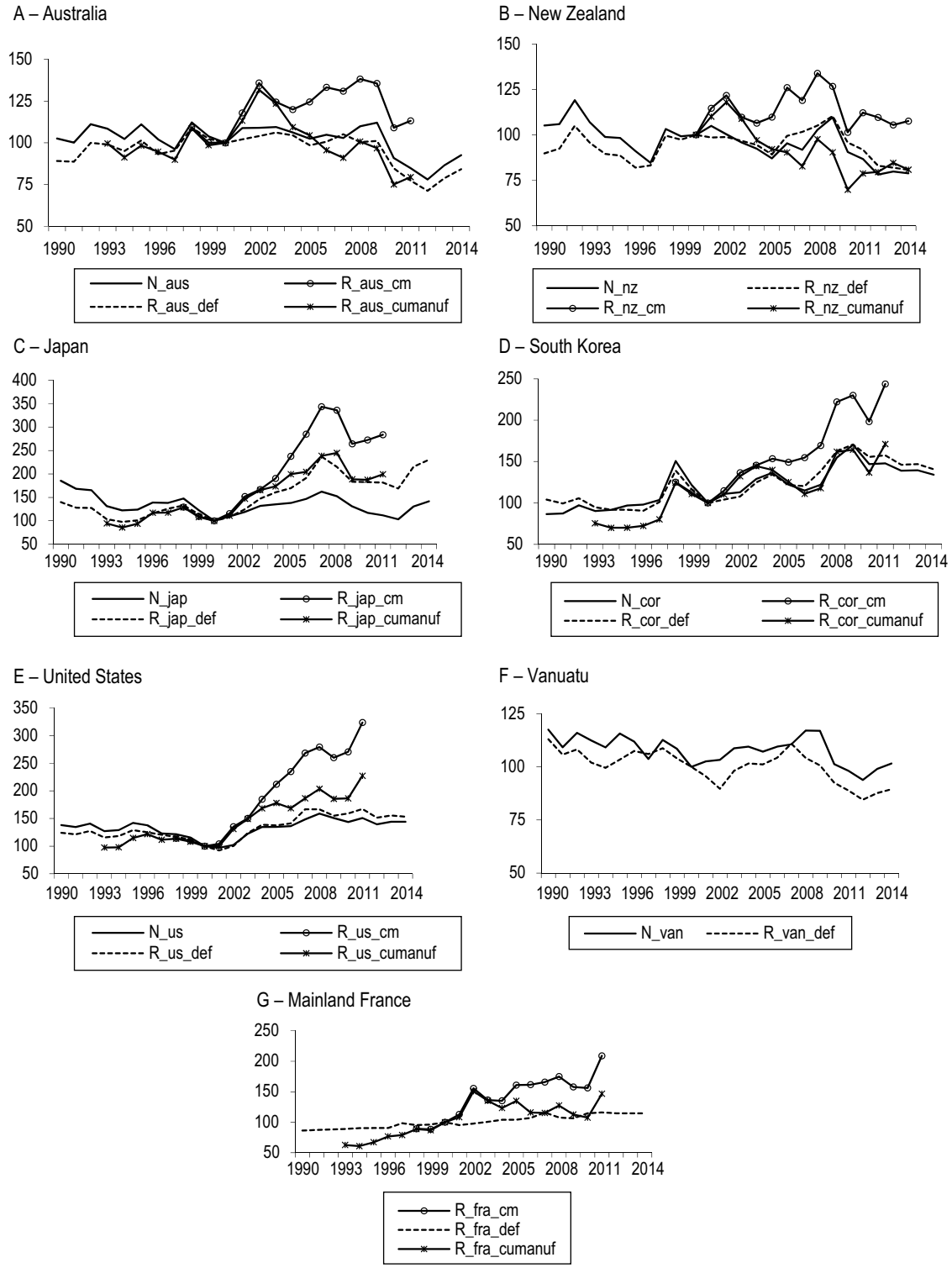
with $\dot{R}_t$ the first difference in the logarithm R_t.

Thus, all other things being equal, an increase in unit costs, in one or more sectors, will lead to a deterioration in the New Caledonian economy's competitiveness.

(a) This hypothesis could be removed and the case of imperfect competition considered. This would lead to the introduction of a mark-up process to describe price behaviour, either: $p=\mu .cu$, with μ the mark-up and *cu* the average unit cost. This would amount to adjusting the real exchange rates for the mark-up ratio, and therefore the margin rates of NC and the partner country; however, this would not change their longer-term dynamics.

(b) We assume these proportions to be identical in the different countries, in order to simplify the expression of these relationships. This does not call into question the conclusions that can be drawn following a change in unit labour costs in the New Caledonian economy.

Figure XII
Competitiveness of New Caledonia compared to its main trading partners



Notes: The rates in indices, base 100 in 2000. An increase (decrease) in the index indicates a real appreciation (depreciation) of the exchange rate or a loss (gain) of competitiveness of the New Caledonian economy compared with the partner in question. *N_i* indicates the bilateral nominal exchange rate between the Pacific franc (FPF) and the currency of the partner country *i*. *R_i_j* indicates the real exchange rate against the country *i* calculated on the basis of price indices (equation (1) of Box 2) or unit labour costs (equation (3) of Box 2) expressed as *j*. *i* refers respectively to Australia (aus), New Zealand (nz), Japan (jap), Korea (cor), United States (us), Vanuatu (van), mainland France (fra); *j* reflects GDP deflators (def), unit costs in the manufacturing sector (cumanuf) and the average unit cost in New Caledonia (cm). Real interest rates were calculated for the period 1990-2014 using GDP deflators, for the period 1990-2011 using unit costs in the manufacturing sector (2000-2014 for New Zealand), and lastly for the period 1998-2011 when the average unit cost of New Caledonia was used.
Sources: ISEE, authors' calculations for the unit costs of New Caledonia. For Australia, Japan, Korea, the United States and mainland France, unit costs in the manufacturing sector come from the *Bureau of Labor Statistics* (https://www.bls.gov/ilc/); for New Zealand, they come from the *New Zealand Statistics database* http://nzdotstat.stats.govt.nz/wbos/Index.aspx. These data are not available for Vanuatu. Data on GDP deflators are derived from the *International Financial Statistics* CD-ROM.

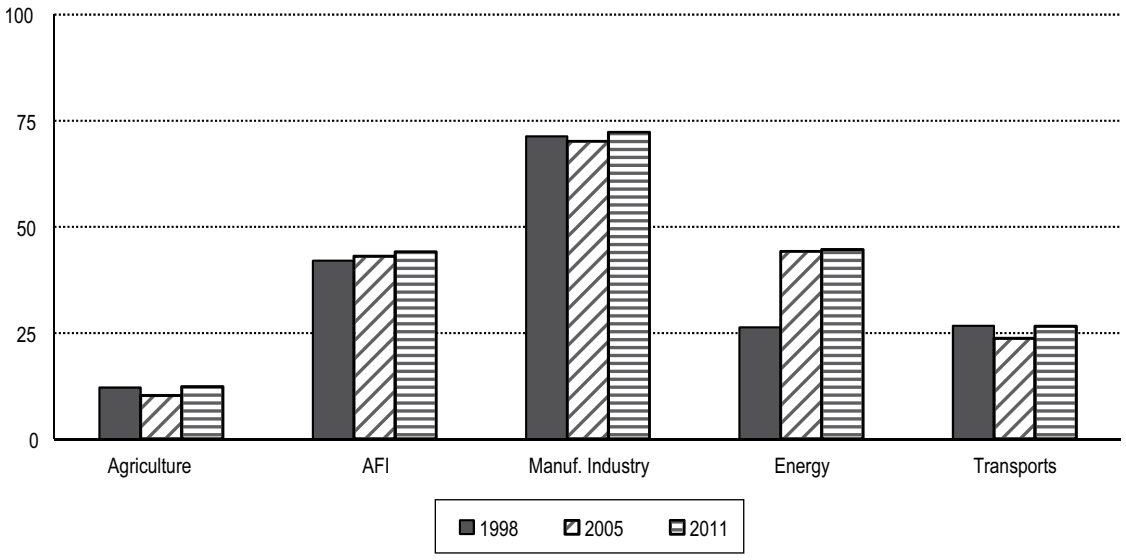
* *
*

Winters and Martins (2004) showed the difficulties of small island economies in being competitive, even when specialised, mainly due to dis-economies of scale and high transaction costs. New Caledonia is no exception. Like other French overseas territories, it suffers from certain handicaps stemming from its remoteness, its climate-related vulnerability or the narrowness of its domestic market, to name a few, even though it is the only one to benefit from significant mineral resources. Advantaged by significant nickel reserves and large public transfers from the French State, New Caledonia has developed an economic model based on strong domestic market protection and nickel exports. This has naturally led to an extensive growth model based on the accumulation of labour and capital. However, growth, although boosted by large investments in the nickel sector during the 2000s, has more recently tended to run out of steam. Without significant productivity gains, wealth creation will no longer be sufficient, in particular to absorb new entrants into the labour market and reduce social inequalities. The productivity indicators proposed in this study highlight the weak performance of the New Caledonian economy, where major sectors such as mining and metallurgy, energy or transport have seen their productivity decline since the 2000s. The result has been, at the level of the economy as a whole, a stagnation or even long-term decline in productivity, partly linked to poor performances in the nickel sector.

At the same time, these poor performances in terms of productivity have weighed down on unit costs and ultimately on price/cost competitiveness (real exchange rates). The real exchange rates appreciation relative to the main partner and/or competitor countries, which are the consequences of both increases in unit costs and at certain times of the nominal appreciation of the F. CFP anchored to the euro, are not likely to allow the New Caledonian economy to move away from its dependence on the nickel sector.

In order to overcome these competitiveness deficits, a number of initiatives have emerged in recent years. In particular, the Avenir Export cluster (Avex) created by the Federation of Caledonia Industries (FINC) in 2015 and open to all those whose operations are connected with export (production, transport, services) is dedicated to the operational development of New Caledonian exports. It aims to enable

Figure XIII
Import penetration rate by branch in New Caledonia



Note: The penetration rate measures the share of domestic satisfied by imports. It is calculated by comparing imports in value terms with the difference between the value of domestic production and the value of exports, i.e.: [Imports/(Production-Exports+Imports)].
Scope: New Caledonia.
Sources: Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec; authors' calculations.

companies to pool their resources in order to achieve the critical mass needed for export.

More broadly, a return to sustained medium-term growth in New Caledonia now requires a change in the growth model, finding endogenous drivers – education and training should be one of the pathways given priority to improve productivity and generate greater competitiveness (see in particular the recommendations by Ris *et al.*, 2017) – and relying on the continuation of a set of social, economic and fiscal reforms.

The 2014 economic, social and fiscal conference, which brought together most political parties and employers and trade union organisations resulted in the adoption of a shared economic, fiscal and social agenda, setting New Caledonia on the path to economic model reform. Several taxes, duties and contributions have since been introduced successively, and various tax measures have also been decided. They pertain to indirect taxation (the central measure of which is the creation of the General Tax on Consumption – the TGC, local VAT – which would replace 7 import taxes), direct taxation (reform of the tax on income, creation of additional centiles on income tax on transferable securities, a complete overhaul of the additional contribution to corporate tax, etc.), and financing for the social protection system (creation of the local Caledonian solidarity contribution, the equivalent of France's CSG, an increase in tobacco tax, etc.). In terms of market protection, the government is committed to ensuring that the general interest is respected by stepping up its requirements with regard to companies benefiting from protection measures. "Performance contracts" have been concluded between the government and the companies involved, which set counterparties for protection in terms of investment, employment, quality, prices and wealth sharing, however, these contracts are not binding for the time being (CEROM, 2017). Lastly, a competition authority was recently set up in February 2018, with responsibility for seeing to the proper functioning of the markets, as well as monitoring business concentration projects and requests to open, enlarge, take over or change businesses, and, if necessary, to sanction practices found to be in violation of New Caledonian competition law.

There is a strong expectation from all players regarding this set of measures, which has the potential to set off a new growth process that is no longer linked to *diptych* domestic market protection/nickel exports. □

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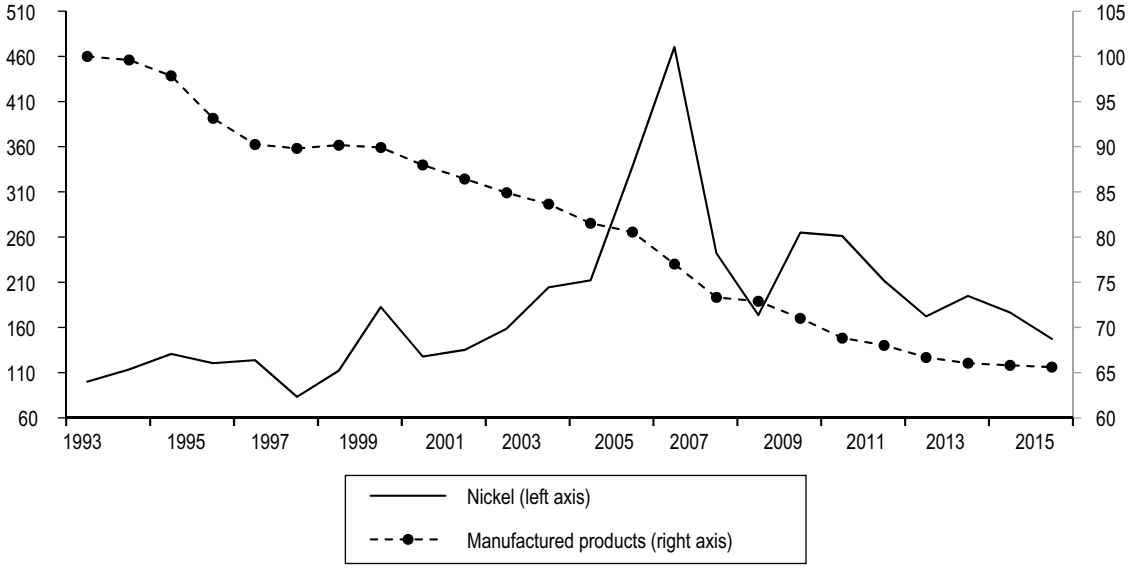
APPENDIX 1

RELATIVE PRICES

Relative prices are defined as the ratio between the price of nickel and the price of services and the ratio between the price of manufactured goods and the price of services. They are expressed in indices, base 100 in 1993.

Figure A1
Relative prices of traded and non-traded goods



Note: The manufacturing sector includes agri-food industry products, extractive industry products, textile industry products, capital goods and all other industrial products. The services sector includes hospitality and catering services, financial and insurance services, real estate services, services provided to households and business, and services provided by the public administration.
Source: ISEE (http://www.isee.nc/); authors' calculations

APPENDIX 2

DATA AVAILABLE FOR CALCULATIONS OF LABOUR PRODUCTIVITY BY SECTOR

• Based on deflated Value added: (VA/Price) / Salaried jobs

• Based on production data: Production / Salaried jobs

Table A2-1
Variables used for labour productivity calculations by sector

Sectors/Sub-sectors	Business variables used	Units for physical production	Salaried jobs in
Agriculture, hunting, forestry, fishing, livestock farming	1. VA (F. CFP) 1998-2014 2. Total production 1992-2014	2. Tons	Agriculture, forestry and fishing 1992-2014
Nickel industry (mines and metallurgy)	1. VA (F. CFP) 1995-2014 2. Iron-nickel metal production 1992-2014	2. Ton of nickel contained	Total jobs in the nickel sector (mining, metalworks, contractors and rollers) 1992-2014
Manufacturing industries excluding mining industries (including AFIs)	1. VA (F. CFP) 1992-2014	(a)	Manufacturing industry 1992-2014
Construction	1. VA (F. CFP) 1992-2014	(a)	Construction 1992-2014
Energy	1. VA (F. CFP) 1992-2014	(a)	Production and distribution of electricity, gas, steam and air conditioning 1992-2014
Transport and telecommunications	1. VA (F. CFP) 1992-2014 2. Maritime and air transport (goods) 1992-2014	2. Thousand tons	Transport and warehousing for calculation from maritime transport. To this are added jobs in communications for the second calculation from VA.1992-2014
Tourism	1. Number of tourists - days 1992-2014	Thousands of tourists x duration of stays	Accommodation and catering 1995-2014
Retail Trade	1. VA (F. CFP) 1992-2014	(a)	Retail trade 1995-2014

Note: This table presents the variables used to calculate labour productivity in each of the sectors. Productivity is defined as the ratio between an activity indicator stated in volume terms and the number of jobs. The reference activity variable is value added. For 3 sectors, production volumes were used as the second indicator of activity. The tourism sector is handled separately: insofar as we do not have data on value added, we look at the number of tourists. The quantity of work is measured by the number of salaried jobs. The last column shows the scope taken into account in measuring these jobs. (a) indicates that a single productivity indicator was calculated, based on the VA.
Sources : Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec; estimated value added figures for years 2012 to 2015.

Table A2-2
Calculations of labour productivity by sector based on value added in volume terms

Sector	Deflator	Correlation coefficient between productivity calculated based on VA and based on production of goods or services 1998-2014
Agriculture, hunting, fishing, forestry and breeding	Unit value index of agricultural products (b)	0.67
Nickel industry (mines and metalworks)	Nickel price at LME in F. CFP	0.72
Manufacturing industry (including AFIs)	Price of manufactured products	NA (a)
Construction	Construction cost index BT21	NA (a)
Energy	Energy prices	NA (a)
Transport and telecommunications	Average wages in services and oil price per barrel in F. CFP	0.74
Retail Trade	Prices of services	NA (a)

Note: NA (a) for not available means that only one productivity indicator has been calculated from the VA. (b) indicates that the unit value index of agriculture is calculated as the weighted average of the unit value indices of the various products in the sub-sector, determined by computing the ratio between the good's produced value and the volume of production (in tons). Weights are determined based on the proportion accounted for by each product in agricultural production.
Sources : Institut de la statistique et des études économiques de la Nouvelle-Calédonie (ISEE) - Comptes économiques définitifs; Comptes économiques rapides de l'Outre-mer (CEROM, 2016) / Nouvelle-Calédonie and Tableaux de l'économie calédonienne 2016, http://www.isee.nc/publications/table-de-l-economie-caledonienne-tec ; authors' calculations.

Comment
Long-term productivity in the French Pacific territories

Comment on the articles "*Economic growth and productivity in French Polynesia: a long-term analysis*" by Vincent Dropsy and Christian Montet and "*Sectoral labour productivity and economic competitiveness in New Caledonia*" by Serge Rey and Catherine Ris

Vincent Caupin*

Abstract – Limited access and small size of the domestic market hamper long-term productivity gains of New Caledonia and French Polynesia, like independent small island economies. Institutional agreements setting up their relationship within France also impact their productivity. The two articles presented here analyse long-term productivity gains, for the first one through total factor productivity and for the second one through labor productivity. They both conclude that the two entities have barely experienced productivity gains since the early nineties and that their growth dynamics were mostly extensive. Local governments economic policies – specifically revenue policy and competition policy – will play a crucial role to promote productivity gains needed to ensure long-term growth of the two economies.

JEL classification: O13, O40, O56
Keywords: New Caledonia, French Polynesia, productivity, competitiveness

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This issue offers two articles on long-term productivity dynamics on the French Pacific islands and provides welcome insight into the economies of these remote territories of the Republic, which have been experiencing significant developments these past years. The first article, by Vincent Dropsy and Christian Montet, focuses on French Polynesia while the second, by Serge Rey and Catherine Ris, deals with New Caledonia.

General background

Before presenting and commenting on the main lessons which these two articles offer, we propose to recapitulate certain characteristics of the two economies, essential to understanding the issues at stake in their changing productivity trends. New Caledonia and French Polynesia are reined in by two primary issues: land-lock and a small domestic market. Like small independent island economies, they experience these as detrimental to their productivity, all the while boasting specific characteristics as part of the French Republic, which also influence the level and dynamics of their productivity.

The high degree of isolation experienced by New Caledonia is even more strongly felt by Polynesia, due to its widely-scattered archipelago: these are emerged spaces which, combined, amount to barely 3,500 km^2, yet are spread across a maritime surface as large as the European Union. This remoteness puts these islands at a disadvantage, both in terms of cost and access to the global markets. Moreover, these barriers are due at least as much to low traffic as to distance: a detour via Nouméa or Papeete generates a marginal cost per good transported that is all the higher as the average volume transported is limited. Due to historical, cultural, entrepreneurial and institutional ties, mainland France remains a preferred commercial partner to both islands, notwithstanding all the costs arising from trade between partners 15,000 km apart.

The small size of their internal market also limits the economies of scale and agglomeration which local companies can achieve and makes certain capital-intensive activities, not focused on export, structurally unprofitable. Although the population has grown significantly over the past 50 years, shaped by the natural balance and migratory phenomena, New Caledonia and French Polynesia remain sparsely populated, each being home to around 275,000 inhabitants. As a result, the size of their economy remains modest and significantly smaller than that of the smallest of metropolitan French regions, Centre-Val de Loire: New Caledonia's GDP (€8 billion) amounts to only 11% of the latter's.

The economic dynamics of the two island territories have widely diverged over the last two decades. The New Caledonian economy benefited from a threefold positive shock over the period from 1998 to 2012: a shock in the terms of trade, thanks to the high prices of its main export, nickel; an investment shock resulting from the construction of two new metallurgical factories, built to increase mining of nickel resources; and a confidence shock following the signing of the Nouméa agreement in 1998, which offered a stabilised institutional investment framework for twenty years, and thereby facilitated the investment decisions of companies and households (CEROM, 2008 and CEROM, 2017). While these favourable factors have since fallen away, driving the economy into a phase of weak growth, New Caledonia's GDP has more than doubled in the last 20 years. In contrast, as shown in the article by Vincent Dropsy and Christian Montet as well as in the CEROM's study (2007), since the end of the Pacific Testing Centre (CEP)'s construction and operation and the public investment shock it generated, the Polynesian economy has, conversely, seen its GDP per capita go into stagnation, even entering depression between 2008 and 2012, according to the authors. All in all, while the two economies were similar in size 20 years ago, New Caledonia's GDP now exceeds that of French Polynesia by 75%.

Economic literature has shown that the geographic isolation and market size issues characterising small island economies make growth far more dependent on an increase in production factors, whether capital or labour, than on an increase in total factor productivity. The goods or services in which these economies have comparative advantages at the international level (like tourism) are those that offer low productivity gains over the long-term. That both these territories are part of the French Republic, with specific constitutional and institutional rules governing their relations, adds further characteristics that impact their productivity trends.

From an institutional point of view, French Polynesia is the largest territorial authority governed by Article 74 of the French Constitution, alongside Wallis and Futuna, Saint Pierre and Miquelon, Saint Martin and Saint Barthélemy.

New Caledonia, meanwhile, benefits from a special status defined in Section XIII of the Constitution ("transitional provisions relating to New Caledonia"), according to which a referendum is to be held in November 2018, determining its accession to full sovereignty and independence. In application of these constitutional articles, the two authorities have a status that "takes into account the interests of each within the Republic" (art. 74) and enjoy considerable autonomy, particularly from an economic point of view. Apart from currency and credit, all the economic powers are held locally. The Polynesian and New Caledonian governments thus hold powers over direct taxation (both corporate tax and income tax, which moreover does not exist in French Polynesia) and indirect taxation, commercial policy, support for enterprises, labour law (including minimum wage), vocational training, competition, etc. All these policies influence the productivity of the two economies. The choices made by the two territories' successive governments, which favoured policies protecting local production, combined with the transaction costs caused by being land-locked, have resulted in the highest cost of living in all of the national area.

Thus, while the two territories hold most of the economic powers of independent countries, two key characteristics distinguish them:

(i) they receive substantial financial support from the State. This support is the result of a constitutional obligation under internal law that ensures stability through high levels of State transfers, whereas an independent country benefiting from financial flows under official development aid (ODA) policies enjoys less predictability in the said aid and, moreover, often less significant financial support. Financial support remains significant: net public transfers from mainland France account for 12% and 24% respectively of the wealth created in New Caledonia and French Polynesia. These transfers mainly come in the form of remuneration for civil servants and financing for investment programmes. The current principle of over-remuneration for civil servants has both diffusion and knock-on effects on private sector wages and apparent labour productivity;

(ii) the monetary arrangements in effect exempt them from external constraints. Both islands are part of the Pacific franc area, which also includes Wallis and Futuna, with the Pacific franc managed by the Central Bank for Overseas France (IEOM). Created in 1945, the Pacific franc is pegged to the euro (previously to the French franc) under a set exchange rate – defined by decree – and has not seen any change in parity since 1949. The State ensures the unlimited convertibility of the Pacific franc via an IEOM transaction account mechanism to the Public Treasury. This system guarantees the currency's credibility and allows the Pacific authorities not to be subject to the external constraint that so hampers small independent island economies, pushing them to develop multiple strategies (specialisation in tourism, tax havens, etc.) to finance the gap between their goods imports and exports. This lack of constraint reduces the need for international competitiveness and therefore the need to achieve productivity gains.

Key learnings from both articles

The general framework having been set, what do the two articles in this issue teach us? The article by Vincent Dropsy and Christian Montet offers a long-term analysis of economic growth and changing patterns in productivity, based on a series of data relating to the period 1959-2006. Statistical availability constraints prevent the authors from extending the analysis any further, and thus analysing shifts in productivity during the protracted economic crisis in Polynesia since 2008. However, one of its main points of interest lies in its showing that the Polynesian economy veered off course well before 2008 and, even before going into negative growth, saw its GDP per capita stagnate for 20 years.

To understand the reasons behind this, the authors use a classic approach inspired by Solow and Mankiw to break down French Polynesia's economic growth in order to dissociate the elements attributable to the increase in production factors (capital, labour and human capital) from those linked to total factor productivity, in other words, technological change, market organisation or public governance. The most powerful conclusion from their analysis is that it is possible to separate the long-term economic trajectory of French Polynesia into two distinct periods. Between 1959 and 1987, the accumulation of capital and the improvement of total factor productivity played a decisive role in the island's economic performance; this was a period of massive public investment for construction, followed by the development of the CEP. Since that time, capital stock has decreased slowly and, above all, total factor productivity has stagnated, reflecting, according to the authors, the existence of structural

obstacles to growth (high costs, and poor allocation of resources due to protectionist policies). As to labour productivity alone, it has also stagnated over the last three decades. This reflects the fact that the post-CEP development strategy has not been able to stem the economic consequences of the exit from the nuclear test era. Over the whole period considered in this study, however, the labour factor saw continuous growth, which was also the case of human capital mostly, reflecting the significant efforts dedicated to education.

The article by Rey and Ris on New Caledonia covers a shorter period (1992-2014) and focuses on a single component of total factor productivity: labour. The authors calculate the labour productivity of the eight main sectors in the New Caledonian economy, linking an activity indicator to paid employment. The results show that only four sectors (agriculture, construction, manufacturing industry and trade) have seen their apparent labour productivity improve over the period in question, while the two main export sectors, nickel and tourism, saw a decrease. The authors then calculate average total and non-nickel productivity to conclude that the former tightened over the period (given developments specific to the nickel sector), while the latter improved slightly. The authors then propose to extend the analyses by looking at unit labour cost, comparing the wage rate to labour productivity. Using the guaranteed minimum wage (SMG) as their foundation, they show the increase in unit costs. The SMG was used due to a lack of available data on wages by sector; this can be considered a shortcoming in the analysis insofar as the New Caledonian government has for 15 years conducted a deliberate policy to increase the SMG which has not had an equal-proportional impact on all wages in the economy. However, the analysis is corroborated by the use of a unit cost for the economy as a whole. The article ends with a section based on real exchange rates, which shows New Caledonia's loss of competitiveness compared with the majority of its trading partners, the said loss being more prominent in the market sector.

Implications for public policy

The two articles thus show the virtual lack of productivity gains since the early nineties for the French territories in the Pacific. They also highlight the fact that periods of strong growth were fuelled above all by the increase in production factors, i.e. via extensive growth. What can be deduced from this in terms of economic policy recommendations? While this is not the main entry point for the two articles, the authors nevertheless put forward a number of suggestions.

Dropsy and Montet focus on French Polynesia in the period 1997-2000, the only time since 1987 when the island experienced an improvement in total factor productivity, to derive insights from this. They point out that this period is marked by three structural changes – a reduction in protectionism, growth in public investment, particularly in transport, and an increase in density in the Tahiti urban area – all favourable to scale and agglomeration effects. Rey and Ris mention, meanwhile, that although the education level of the New Caledonian population has increased, it remains significantly below the OECD average, and suggest increasing investment in education. The two articles lastly highlight the role of the market protection measures decided by local governments which, by extending the size of the sector protected from international competition, reduce incentives for companies to achieve productivity gains, when the economies are already not forced to deal with the competitiveness imperative, in contrast to independent countries.

The long-term economic growth of the New Caledonian and Polynesian economies cannot be sustained solely by accumulating production factors, whether capital or labour. The investment rate in New Caledonia has therefore been very high for more than a decade, leading to marginal efficiency in decreasing physical capital. The economic policy implemented by local governments has a fundamental part to play in boosting productivity gains through appropriate incentives for companies. The adoption of a genuine competition policy that takes into account the features specific to small economies, which favour monopoly and oligopoly situations, is particularly crucial. Initial steps have been taken in this direction with the very recent creation of competition authorities (in 2015 in Polynesia; in 2014 in New Caledonia with operations beginning in February 2018), which must now prove themselves by sanctioning anti-competitive behaviour. Fiscal policy, by gradually replacing customs duties with indirect taxation, also has a key part to play (Ris *et al.*, 2017). □

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An international comparison of school systems based on social mobility

Mattéo Godin * and Jean Hindriks **

Abstract – We propose an international comparison of school systems in OECD countries in terms of social mobility in schools based on the PISA (Program for International Student Assessment) test results in mathematics between 2003 and 2015. For each country, we calculate students' interdecile social mobility in schools on the basis of their ranking in the PISA test in mathematics, compared to their social ranking in their country, and compare this new index of equity to those generally used in OECD studies (slope and intensity of social gradient, percentage of resilient students). A new representation, the "Great Gatsby curve of school", in reference to the Great Gatsby curve of income, is proposed: the social mobility of a school system is closely linked to the educational inequality between students and schools. Countries such as Belgium or France with high levels of school inequality also stand out for low social mobility in schools. Inversely, countries such as Finland or Canada are characterised by low school inequality and high levels of social mobility in schools. A second important conclusion of the analysis is that the countries in which social mobility in schools is above average are also most often those with school achievement levels above the average.

JEL Codes/JEL Classification : I21, I24
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Two school systems can be identical in terms of inequality in students' academic achievement, but very different in terms of social mobility in schools, meaning the prospects for students from socially disadvantaged families to become some of the best students. This is an upward mobility prospect, from the bottom to the top of the social ladder. In the reports produced by the OECD, social mobility in schools is often analysed by comparing the academic achievement of students from different social backgrounds using a composite economic, social, and cultural status index (ESCS). The link between achievement (or test scores) and the socio-economic index of students is thus very rigorously analysed in the OECD's studies, which focus on the equity of school systems (see OECD, 2014a; OECD, 2016). The OECD distinguishes the slope of the social gradient, which measures the difference in score associated with a unit variation in students' socio-economic index, and the intensity of the social gradient, which measures the proportion of variance in score attributable to the variation in the socio-economic index of students.

However, this measure of social mobility in schools based on the social gradient presents several drawbacks. First of all, it assumes a linear relationship between students' test score and their socio-economic index. As a result, an essential component of social mobility is lost: the "unlikely success", i.e. the fact that underprivileged students can be top performers; the OECD refers to these as "resilient students"[1]. The relationship between students' achievements and their socio-economic index is therefore not necessarily linear, and imposing it can lead to erroneous interpretations. For example, the intensity of the social gradient is an index that overestimates social mobility in schools in countries where the link between academic results and socio-economic status is convex[2]. Second, social mobility based on the social gradient is governed by a cardinal approach, which is more sensitive to measurement errors, notably in the variation of the socio-economic index. In this respect, we propose a more parsimonious ordinal approach to the use of PISA data: the school ranking and the social ranking of students are put in parallel, without attaching importance to the gaps in test scores and socio-economic variables. Third, the intensity of the social gradient is intrinsically dependent on the dispersion of the scores and that of students' socio-economic indices. This dependence is a problem if one wishes to analyse the social mobility dimension and the educational inequality dimension independently. A cross-cutting approach to social mobility based on inter-decile mobility eliminates this problem of dependency with regard to the variables dispersion because, by construction, the variables are reduced in all countries to a uniform distribution (in deciles, for example). The same comment applies as well to the use of intergenerational income elasticity between parents and children as a measure of social mobility (Black & Devereux, 2011)[3]. This measure mechanically increases if income inequalities increase from one cohort to another. Dahl and Deleire (2008) propose, for this reason, that intergenerational elasticity be replaced with intergenerational rank correlation. Chetty *et al.* (2014) use the latter in their comparison of social mobility in income between different regions in the United States.

In this article, we propose to analyse the social mobility of school systems based on the ordinal approach, in an international perspective. We define a student's social mobility in schools by comparing, within each country, the student's position on the achievement ladder and position on the social ladder. The percentage of resilient students is therefore measured in each country without comparison with the results of students from other countries, contrary to the approach taken by the OECD (2012). This approach to social mobility thus clearly separates the country's average performance and social mobility.

This concept of social mobility in schools is closely tied to the concept of equal opportunity in schools *stricto sensu*. For social justice theorists such as Rawls (1971) and Roemer (1998), a fair system is a system in which there is equal opportunity to achieve academic success and assuming equal diplomas, to access jobs with responsibilities[4].

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1. Resilient students are those in the bottom quarter of the socio-economic index of students whose results on PISA tests are found in the upper quarter, all countries combined (OECD, 2012). This notion of resilience refers back to what the sociology of education terms "unlikely successes" or "paradoxical trajectories".

2. By construction, a linear model has less explanatory power if the relationship between the variables is non-linear.

3. Black and Devereux (2011) propose a summary of the literature on the measurement of intergenerational income elasticity and the mechanisms underlying this intergenerational transmission. Hertz et al. *(2007) compare at the international level the correlation between the years of education of the parents and their children (see Table 2). In our article, we focus on measuring inter-generational transmission in terms of academic results (i.e. quality and not quantity of education).*

4. Our approach also needs to be put in perspective with the approach to inequality of school opportunities put forth by Boudon (1973) according to which: (i) the value attached to a given academic level varies with an individual's social position, (ii) and social position influences the individual's expectations and schooling decisions.

This approach to social mobility is an *ex post* perspective on equal opportunity – *ex post* distribution of school performance based on social origin – not an *ex ante* perspective on equal opportunity – expected school performance *ex ante* depending on social origin, which lines up more with the social gradient approach (Fleurbaey & Peragine, 2013)[5]. On the empirical study of equal educational opportunity from an *ex ante* perspective based on PISA tests, we refer readers to the summary report by Ferreira and Gignoux (2011). It should be noted that our approach to studying social mobility in schools is more restrictive than the classic approach to equal opportunity, in a context that is sometimes multidimensional (income, health, school)[6], which seeks to decompose inequality of outcomes between inequality due to circumstances (compensation) and due to individual choices (responsibility). It should be noted here that some authors such as Kanbur and Wagstaff (2014) are fairly sceptical about the political relevance of this approach due to a twofold problem of measurement and decomposition. This same difficulty can be found in studies aimed at identifying the mechanisms underlying family influence on school achievement, and in particular to identify the relative influence of biological factors (nature) and environmental factors (nurture) in social mobility. Such causal analysis of social mobility and its mechanisms goes beyond the scope of this article. On this topic, we refer readers to the literature review by Bjorklund and Salvanes (2011) which offers, for a few countries, empirical estimates of social mobility based on the correlation of education attainments between brothers (including heterozygote and homozygote twin brothers).

In this article, we will address the issue of the quality of school systems from a broader perspective that includes school performance, school inequality and social mobility. We will see that these dimensions are not necessarily conflicting. In particular, we show that performance is likely to go hand in hand with social mobility. In other words, our approach based on the use of a social mobility index more than confirms the results of the latest studies of the OECD (2014a, 2016), which noted the absence of conflict between performance and social mobility. Furthermore, the real novelty of our study lies in highlighting the inverse relationship between school inequality and social mobility in schools (the "Great Gatsby curve" of school). It is important to specify that our results do not establish any causal link, but are based on correlations, the effect of which is simply to reverse the burden of proof[7].

To conduct our analysis, we used the results in mathematics on PISA tests (2003, 2006, 2009, 2012 and 2015). According to Hanushek and Woessmann (2015), knowledge in mathematics and sciences are good predictors of students' income prospects. Restricting, as we do, the analysis to achievement in mathematics is not believed to lead to bias in the results, insofar as scores on PISA tests in other subjects are strongly correlated (for example, more than 87% between mathematics and reading). Moreover, mathematics typically constitutes a pillar of success and excellence in school. A gap in mathematics skill can trigger either a transfer to a less demanding school, a repeat of the academic year, or redirection to a less-demanding academic track. In addition to assessing students, PISA surveys students about their social background. The social status of students is then measured by the economic, social and cultural status index (ESCS), a composite index that incorporates, in addition to the profession and the level of education of parents, a measure of the family's educational and cultural resources (number of books at home, place to study, presence of artworks, a dictionary, etc.). It thus becomes possible to compare the students' educational rank, based on their rank on PISA tests, with their social position, based on their rank in the composite index of social origin[8].

One final clarification should be made here. Our approach to social mobility considers only part of the social inequality reproduction chain: the school system. It is for this reason that reference is made to "social mobility in schools". Our results thus need to be interpreted from this perspective. More generally,

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5. To understand the difference, consider x *the random variable of academic results and* s *the variable indicating the student's socio-economic status. School achievement is distributed according to conditional probability density* f(x;s) *with average* E(x;s). *Equal opportunity* ex ante *consists of equalizing* E(x;s) *for all* s. *Equal opportunity* ex post *consists of equalizing* f(x;s) *for all* s.

6. See Roemer and Trannoy (2015), for a presentation of the main theoretical and empirical contributions on equal opportunity.

7. This is all the truer as we are working on instantaneous data by student cohort (PISA), it is thus impossible to identify time sequences between variables and therefore specify causal changes. In this type of analysis, it is also always risky to deduct from correlations observed at the aggregate country level any causal relationship at the individual level. One advantage of comparing countries, and not schools, consists of eliminating all student selection problems between schools that strongly bias relations between inequalities and school performance (Hanushek & Woessmann, 2011).

8. The PISA data in mathematics are of good quality and relatively well harmonised to enable a precise and comparable measure between countries of the link between socio-economic status and school performance (in contrast to a social mobility analysis based on income).

it is also important to study, downstream from the school, the role of the labour market and, upstream of the school, the role of parent-child transmission. As research in sociology clearly suggests, a school that is non-egalitarian yet awards degrees with little influence on the professional futures of students would not be a catalyst for reproducing social inequalities. Conversely, an egalitarian school with degrees leading to a strict hierarchy of jobs, would play a decisive role in the reproduction of inequalities as the most favoured social classes would always enjoy a decisive academic advantage (see Dubet *et al*., 2010). In an article that has since become renowned, Solon (2004) proposes a social inequalities reproduction model integrating all these three levers: hereditary transmission (via cognitive skills and non-cognitive attitudes, themselves the complex interaction between biology and social environment), school transmission (via private and public investment in education), and professional transmission (via the parents' professional network). Our international comparison of school systems reflects school mobility in different countries, which is to be contrasted with differences in professional mobility and inequalities on the labour market between the same countries. To be clear, this article does not presuppose that young people's future is determined entirely in schools and that there is no chance of social success outside school. It should also be noted that the "psychological" hold of diplomas has become a reality in many countries, with people willingly believing that the entire fate of individuals is determined by their studies. Social success through academic success appears, in such cases, to be more important than social success through professional merit. While the hold of schooling can be regretted, it is a reality in which our analysis, focused on the school as a vehicle for inequalities, takes on its full meaning.

Social mobility

A distinction is made between three forms of social mobility: absolute mobility, relative mobility and ordinal mobility. The first two are most often used to measure social mobility on the basis of income (Fields & Ok, 1999). The purpose of this section is to compare the ordinal mobility of school systems in OECD countries. We limit our analysis to only those Member Countries that have participated since the start (2003) in PISA surveys (27 out of 35 countries)[9]. The reason for this restriction is not only the availability of PISA data, but also a concern to build a group of countries that is relatively homogeneous, economically and socially. This is because international comparisons open themselves up for criticism when they integrate groups of highly heterogeneous countries with overly differing scales of student performance and socio-economic status. This observation is particularly important in our case, as we know that the influence of socio-economic status on academic performance is very different by group of countries studied (see OECD 2014a, Figure II.2.3)[10]. The comparison tools are Spearman's correlation coefficient and inter-decile mobility. These two indicators measure mobility from a purely ordinal point of view in the form of mobility between social position and academic position. Inter-decile mobility also makes it possible to distinguish upward mobility from downward mobility.

In such a perspective, education is viewed as a "positional" good and not as an absolute good that has a direct positive effect on students (see Dubet *et al*., 2011). Consequently, to circumvent the zero-sum game in which a position gained by a student implies a position lost by another student – as indeed assumes the principle underpinning Spearman's correlation, we weight students' social mobility based on their initial social position. Concretely, we apply a new index that places greater emphasis on the upward mobility of students found at the bottom of the country's social ladder: the interdecile mobility index. According to this index, each place gained in the school rankings by a disadvantaged child "counts more" than each place lost in the same school rankings by a child from a well-off background. Then, to this approach to social mobility in schools, we add a measure of the average performance of school systems to assess the interaction between these two criteria. We conclude the

9. The countries included are Australia, Austria, Belgium, Canada, Switzerland, Czech Republic, Germany, Denmark, Spain, Finland, France, Great Britain, Hungary, Ireland, Iceland, Italy, Japan, South Korea, Luxembourg, the Netherlands, Norway, New Zealand, Poland, Portugal, Slovakia, Sweden and the United States.

10. Keskpaik and Rocher (2011) propose a categorisation of countries according to their "equity profile" depending on the relative importance of the different components of the PISA index on student socioeconomic status. Our list of 27 OECD countries encompasses Groups 1 and 2, respectively, characterised by lesser influence of the social environment and the importance of cultural capital. In reality, the PISA index of socioeconomic status was estimated on the basis of OECD countries only and not partner countries (Rutkowski & Rutkowski, 2013). Our decision to restrict the focus to OECD countries therefore lends greater robustness to our international comparison of social mobility.

analysis by comparing the school inequalities and the related social mobility.

Spearman's mobility in schools

Spearman's mobility is based on Spearman's rank correlation[11]. For each country, students are ranked on the basis of their socio-economic index and this ranking is compared with their ranking based on their result on the PISA test (see Box on data processing). We then measure the rank correlation between these two rankings, the so-called Spearman correlation. Spearman's mobility is equal to 1 minus Spearman's rank correlation. Spearman's mobility thus measures the absence of link between the student's social position and the student's academic position. If the two rankings are perfectly correlated in the sense that the student's social position is identical to the student's academic position, the Spearman mobility index is equal to zero. Inversely, if the academic position is independent of the student's social position, the Spearman mobility index is equal to 1 (perfect mobility if Spearman's correlation is equal to zero). One weakness of the Spearman mobility index is its relative instability due to the high sample variability in individual mobilities in PISA. One of the first ways of limiting this effect is to work with several waves of PISA surveys to stabilise the mobility measurement. This is what we do by merging the PISA 2003, 2006, 2009, 2012 and 2015 studies.

The OECD countries have all a Spearman mobility above zero but less than one. In other words, students' social position is partly correlated with their academic position. Students' academic results within the same country are linked to the socio-economic position of students within the same country. However, this link varies from country to country (Figure I). Belgium's Spearman mobility index is the 7th lowest out of the 27 countries considered

11. For a normative justification of this measure of social mobility, see Agostino and Dardanoni (2009).

Box – **Technical note on data processing (PISA 2003-2015)**

Analysis was based on a sample of 1,031,451 students age 15 covering over 8,000 schools in 27 OECD countries over 5 years (2003, 2006, 2009, 2012 and 2015)[a]. These countries are Czech Republic (CZE), Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), the Czech Republic (CZE), Germany (DEU), Switzerland (CHE), Denmark (DNK), Spain (ESP), Finland (FIN), France (FRA), Great Britain (GBR), Hungary (HUN), Ireland (IRL), Iceland (ISL), Italy (ITA), Japan (JPN), South Korea (KOR), Luxembourg (LUX), the Netherlands (NLD), Norway (NOR), New Zealand (NZL), Poland (POL), Portugal (PRT), Slovakia (SVK), Sweden (SWE) and the United States (USA).

In PISA studies, instead of only one value on a PISA test score, a set of "possible values" and associated probabilities are found for the students. The "possible values" therefore represent not only an estimate of competencies, but also the uncertainty associated with this estimate. This uncertainty is inherent in the PISA test in which, due to time limitations, it is not possible to ask the students tested to cover all the questions in all subjects. In our analysis, we use the arithmetic average of the different "possible values" (between 5 and 10 depending on the years). For each wave of the PISA survey, we calculate the test score position (rank) of pupils, each in their respective countries, then compare this to their social position (rank) in their respective countries based on "ESCS" index (Economic, Social and Cultural Status).

The ESCS index is a composite index of the student's economic, social and cultural status that integrates the parents' profession (ISEI) and their level of education (PARED), and a measure of the family's educational and cultural resources (HOMEPOS[b]) including the number of books in the home, but also tangible goods, such as the existence of an internet connection, educational resources such as the presence of dictionary and cultural goods, such as the presence of artworks and works of classical literature.

We then aggregate the individual mobility data on the five waves of the survey to calculate an average for each country taking into account the student weights, "Final Student Weight". This student weight aims to ensure greater reliability in results by improving the overall representativeness of the sampling. If these weights are not used, certain students' profiles will be under or over-represented in the sample[c].

a. As mentioned above, this list of countries is the result of the dual requirement to limit ourselves to sufficiently homogeneous countries (OECD countries) that participated in all the PISA tests between 2003 and 2015 and for which the PISA socioeconomic index is sufficiently reliable (see Rutkowski and Rutkowski, 2013).

b. The PISA index on economic, social and cultural status of students (ESCS) is normalised to zero for all countries participating in the PISA survey (72 countries for PISA 2015). Its average value and standard deviation vary from country to country.

c. See Jerrim et al. *(2017) on the importance of using student weights in PISA studies.*

over the period 2003-2015, while France's is the 2nd lowest. In contrast, the mobility indices of Norway, Iceland, Italy and Canada are among the highest.

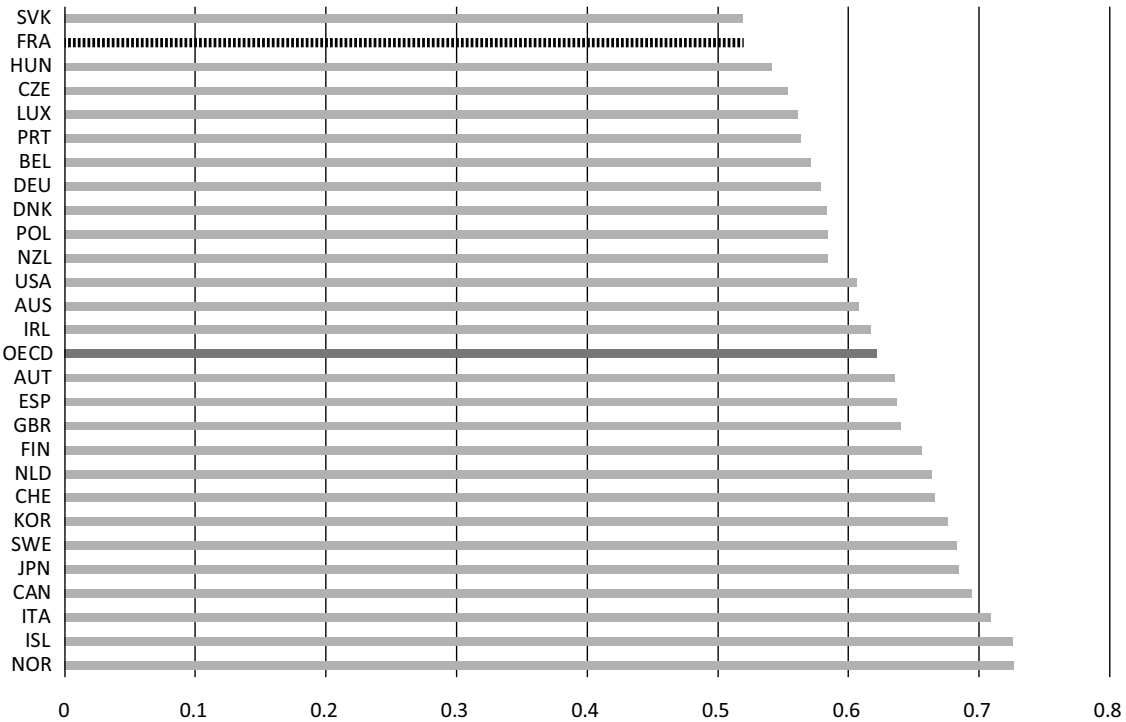
Another way of limiting the impact of sample variability on the Spearman mobility index is to limit individual mobility to interdecile mobility: individual mobility is only registered when there is a change across deciles. Thereafter, we adopt this interdecile mobility measure with a social dimension that, unlike Spearman's mobility, distinguishes upward mobility from downward mobility according to the social position of the students involved. Toward this end, social mobility in schools is no longer necessarily a zero-sum game insofar as, if a socially disadvantaged student moves up one rank at the detriment of a socially-advantaged student, the overall impact on social mobility is positive[12]. It should also be noted that this approach echoes the theory on equal opportunity developed in Boudon (1973), the starting point of which is the simple idea that the importance an individual places on a given academic level varies according to that individual's social position. For example, the Baccalaureate is a greater promotion for a worker's son than for a top executive's son. This theory thus implies that each social position carries a different system of expectations and decisions[13].

Interdecile mobility in schools

According to this approach, individual mobility is only taken into account if the student changes decile between social position and academic position[14]. To determine this, we classify students in each country by socio-economic decile and by decile of score on the

12. In this sense, interdecile mobility in schools goes beyond the model on education as a positional good, the impact of which would be a zero-sum game (see Dubet, 2011).
13. The conclusion of Boudon (1973) is that school policies are illusory in establishing equal opportunity if they fail to change the social stratification of expectations and decisions. Our contribution aims precisely at showing, on the basis of international comparisons, that certain schools systems manage better than others to limit this social stratification with a beneficial effect on both average performance and school inequalities.
14. See above, Chetti et al. *(2014) for a comparable approach to measuring intergenerational mobility in income in the United States.*

Figure I
Spearman's mobility at school (PISA 2003-2015)



Note: Spearman's mobility is equal to 1 minus Spearman's rank correlation. In our case, Spearman's correlation measures the correlation between the social position of pupils and their test score position. The higher Spearman's correlation, the lower Spearman's mobility index.
Reading note: For France, Spearman's mobility index is 52%, compared with 72% in Norway or Canada.
Scope: 27 OECD countries participating in the 2003-2015 PISA surveys.
Sources: OECD, PISA 2003-2015 in mathematics; authors' calculations.

PISA test (using the average of the different possible values for the test in the area of mathematical culture). The first socio-economic decile encompasses the 10% of students at the lowest level of the country's social ladder[15]. The first decile on PISA test includes the 10% of students whose test results are the lowest in the country. For each student, we take the ratio of test decile to the socio-economic decile to calculate individual mobility. A student in the first socio-economic decile found in the 10th test decile therefore obtains an individual mobility ratio of 10/1. Conversely, a student in the 10th socio-economic decile found in the first test decile has an individual mobility ratio of 1/10. Total interdecile mobility is the simple average between individual mobilities[16]. If the entire population has a rank on the test matching its socio-economic decile, then the individual mobility ratio is equal to 1 for everyone and total interdecile mobility is therefore also equal to 1. The upward mobility of a socially disadvantaged student always increases interdecile mobility. The value of the total interdecile mobility index therefore grows with upward mobility. Perfect interdecile mobility is found in situations of equal opportunity in the sense that each social decile is equally represented in each academic decile[17]. The minimum mobility value is equal to 1. We then normalise our interdecile mobility index to state it as a percentage of perfect mobility.

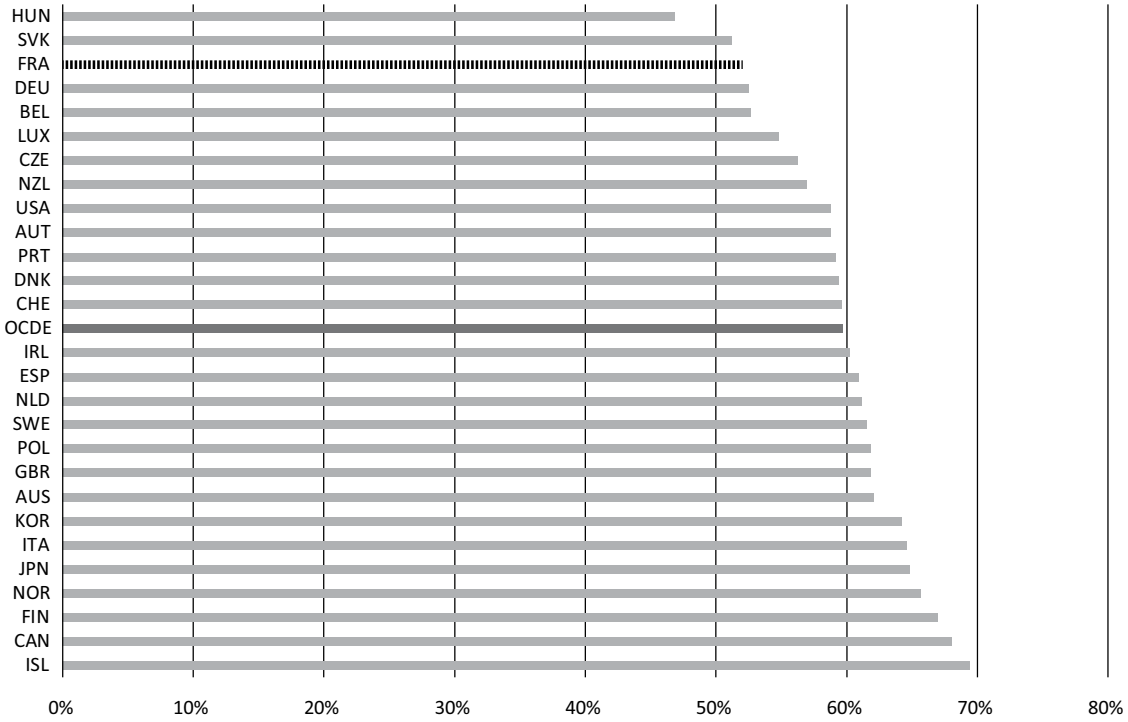
France is at the bottom of the ranking in terms of normalised interdecile mobility (Figure II) with a rate of 52% (as compared to the OECD average of 62%). It occupies the 3rd-worst

15. To be precise, PISA surveys attach a weighting to students in order to ensure that the sample is a correct representation of the different groups in the population (see the OECD's technical report, 2014). The deciles are thus formed by taking into account student weights so as to give the same "total student weight" to each decile.

16. The average between individual mobilities is in fact an arithmetic average "weighted" on the basis of student weights in each successive wave of the PISA study.

17. Perfect mobility is found when, in each academic decile, there is an equivalent number of representatives of each social decile. This situation is one of equal opportunity on average. Formally, perfect mobility is equal to $\frac{1}{100}\sum_{i=1}^{10}\sum_{j=1}^{10}\frac{j}{i}=1.61$, *where* i *indicates the social decile and* j *the academic decile.*

Figure II
Interdecile social mobility at school (PISA 2003-2015)



Note: Normalised interdecile mobility measures the average mobility of students between their socio-economic decile and their test score decile (using student weights). The value is equal to 0 if there is no mobility and increases with upward mobility to reach 100% in the event of perfect mobility. Perfect mobility is found when, in each test score decile, there is an equal representation of each socio-economic decile.
Reading note: In the OECD, the interdecile mobility index is 60%, which means social mobility equivalent to 60% of a perfect mobility situation.
Scope: 27 OECD countries participating in the 2003-2015 PISA surveys.
Sources: OECD, PISA 2003-2015 in mathematics; authors' calculations.

position in the 27 countries over the period 2003-2015. Canada, Iceland and Finland are some of the best in class when it comes to normalized interdecile mobility, with interdecile mobility close to 70%.

One important remark needs to be made here, as we could be criticised for comparing social mobility between countries without taking into account social disparities between these countries. Social disparity is indeed different, whether looking at Finland and Iceland or the United States and Canada. However, the difference in social mobility has a very low correlation with a country's social heterogeneity. If we compare countries based on their social disparity, measured by the dispersion of the socio-economic index of students and their social mobility, the correlation is less than - 0.2. This suggests that it would be difficult to attribute low social mobility to high social disparity. This is partly the result of our mobility index, which flattens out variations in performance scales and socio-economic status between countries by reducing the whole to a uniform decile scale. Moreover, as Dubet *et al*. suggest (2010), the relationships between societies and their school systems are relatively distinct. Societies that are relatively comparable from the social perspective can have very different school systems. Conversely, societies that are relatively different from the social perspective can have very comparable school systems.

Social mobility and social gradient

To assess the equity of a school system, the OECD uses the concept of social gradient (see OECD, 2014a). Social gradient measures the impact of students' social origin on their results on tests. The distinction needs to be made between slope and intensity. The slope of the social gradient indicates the magnitude of the "average" gap in academic achievement between students based on the socio-economic gap between the same students. The intensity of the social gradient indicates the percentage of variance in academic achievement between students attributable to students' socio-economic origin. For all the OECD countries studied in the 2012 PISA survey, the average intensity of the social gradient is 14.8% (see OECD, 2014a, Figure II.2.2). This intensity of social gradient is a measure of inequity, i.e. the percentage of academic inequality that can be explained by socio-economic inequalities between students. We calculate this social gradient's intensity for the successive waves of PISA surveys between 2003-2015, taking into account student weights[18]. This intensity of social gradient is closely correlated with our interdecile mobility index. However, the two indices are logically distinct. This is because interdecile mobility is an ordinal (rather than cardinal) metric of mobility which, moreover, favours upward mobility over downward mobility. This means, most notably, that the proportion of resilient students is better valued with our interdecile mobility than with the social gradient based on the assumption of linear relationship between the social index and test score.

Restricting the link between test scores and social index to a linear relationship can lead to false interpretations. For example, the intensity of social gradient underestimates social mobility in countries where the relationship between academic achievement and socio-economic status is convex (due to less precision in the linear model). Another difference is that the intensity of the social gradient depends mechanically on the ratio between the dispersion in socio-economic indices and the dispersion in academic performance. In particular, for two countries with identical slope of the social gradient, the intensity of social gradient will be mechanically higher in the country where the dispersion in socio-economic indices is greatest and/or the dispersion in student scores is lowest. The reason is simple: the higher the variance of the socio-economic indices, the greater the "explanatory" power of the linear model will be; vice versa, the higher the variance of the test scores, the lesser the explanatory power of the linear model. This is because the intensity of social gradient is formally linked to the slope of the social gradient according to the expression:

$$\sqrt{(social\ gradient\ intensity)} = social\ gradient\ slope \times \frac{SD\ ESCS}{SD\ test\ scores} \quad (1)$$

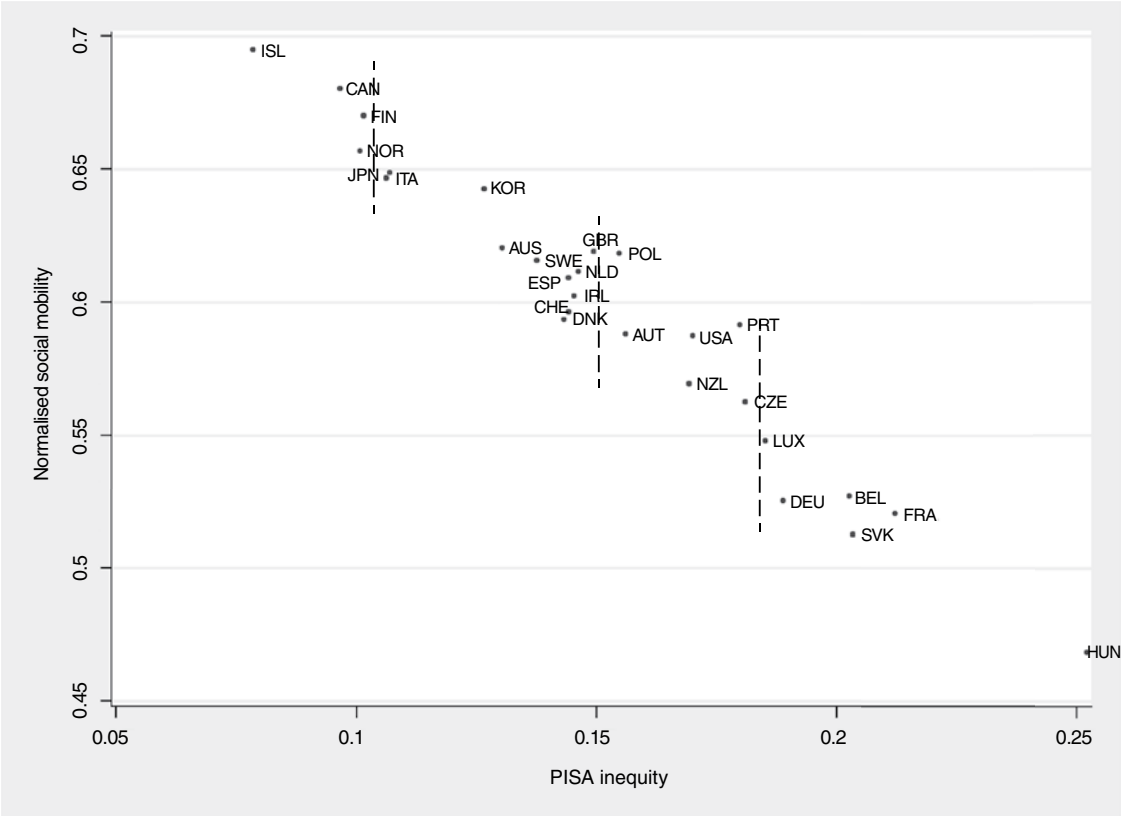
The advantage of our social mobility index is that it does not depend "mechanically" on test scores inequalities or socio-economic inequalities. We can thus compare social mobility between countries with very different educational or social inequalities, without bias in the comparison.

18. It is the index most often used to measure the link between social background and academic achievement. See for example Crahay (2012), Danhier et al. *(2014) and OECD (2014a).*

A comparison between social mobility and the intensity of social gradient comes with a number of surprises (Figure III). Countries like Denmark and Poland, which are comparable in terms of intensity of social gradient, turn out very different in terms of interdecile mobility. With the interdecile approach, Denmark comes out below Poland. The social elevator seems to work better in Poland than in Denmark for the most marginalised students in society, something that was not visible based on intensity of social gradient. Similarly, based on intensity of social gradient, Canada is comparable to Italy, when social mobility is much better in Canada. The school system in Canada thus provides better opportunities to students who are more socially marginalised than does Italy. Another interesting comparison involves Portugal and Germany, which share the same intensity in social gradient, but diverge in interdecile mobility, Portugal faring much better. Conversely, while Portugal and Denmark have the same interdecile mobility, Portugal shows higher intensity in social gradient.

Another standard way of measuring inequality in opportunity is to measure the slope of the social gradient (the difference in score associated with the variation of a socio-economic index unit). The correlation between the slope and intensity of the social gradient in mathematical culture is 0.62 (Oecd, 2014a). The social gradient slope is also correlated with our interdecile mobility index, but only partially. In reality, the social gradient slope is governed by the *ex ante* perspective on equal opportunity (average performance at a given socio-economic level). The interdecile approach, in contrast, reflects the *ex post* perspective on equal opportunity (distribution of performance levels *ex post* for a given socio-economic level). This *ex post* perspective on equal opportunity is more comparable to the intensity of social gradient, the difference being that we do not, in principle, impose a linear relationship between performance on tests and students' socio-economic index. Interdecile mobility therefore, beyond the social gradient, measures the possibility for students from very disadvantaged social backgrounds to perform

Figure III
Social mobility and social gradient (PISA 2003-2015)



Note: The PISA iniquity index measures the proportion of the variance of test scores in mathematics (using student weights) explained by the socio-economic index of students: it reflects the intensity of the social gradient. Normalised social mobility is identical to that in Figure II.
Scope: 27 Oecd countries participating in the 2003-2015 PISA surveys.
Sources: Oecd, PISA 2003-2015 in mathematics; authors' calculations.

beyond expectation (based on the line of social gradient), and thus escape the hold of social environment.

Social mobility and resilience

The OECD (2014a) defines resilient students as students from the lower socio-economic quartile of their country who perform in the upper quartile of all students in a comparable situation in other countries (i.e. in the lower socio-economic quartile). In Denmark, the proportion of resilient students is 4.9%, compared with 6.4% on average in OECD countries (see OECD 2014a, figure II.2.4). Inversely, Poland's percentage of resilient students exceeds the average (8.4%), whereas the intensity of the social gradient is identical between the two countries (cf. Figure III). It could therefore be concluded that it is entirely possible to predict the social mobility index by comparing the intensity of the social gradient with the percentage of resilient students for each country. This is partly true and suggests that the social mobility index brings together in a single index these two distinct criteria, namely the percentage of resilient students and the social gradient. However, it does more than that. Let us compare Belgium and France, which in our figure III show the same interdecile mobility and the same intensity of social gradient. It can be observed, however, that the percentage of resilient students is above the OECD average in Belgium (7.2%) and below it in France (5.2%). Interdecile mobility is thus indeed different from the percentage of resilient students as measured by the OECD. In reality, the OECD defines resilient students on the basis of an international comparison of achievement of socially disadvantaged students (belonging to the lower socio-economic quartile of their country). In contrast, interdecile mobility approaches resilient students on the basis of an intra-national comparison of the results of socially disadvantaged students with all the students in the country. By measuring the resilience within each country, we separate it from the countries' average level of performance. In the approach taken by the OECD, a country can post a high percentage of resilient students if the average level of academic performance is higher than that of other countries, as this makes it easier for disadvantaged children in this country to achieve better results than disadvantaged students in other countries. By separating social mobility from average performance, our approach thus allows for a more accurate measure of the fairness of a given school system. This interdecile mobility index also offers the benefit of approaching social mobility more generally, as it is not limited to studying mobility between the lower quartile of the population and the upper quartile.

In the following section, we compare this metric of social mobility in school systems with their levels of performance and inequality. By contrast to the OECD's social gradient, this indicator of social mobility in schools does not mechanically depend on social inequalities and academic inequalities. As a result, our analysis of the link between social mobility, performance and inequality of school systems takes on a new shading. We call this three-dimensional approach the "golden triangle" of school systems[19]. In particular, we wish to verify whether these three criteria are compatible with one another.

Social mobility and performance

The golden triangle

Let us draw on a figure with bubbles (Figure IV) in which the bubbles' coordinates represent the values of two variables (average score relative to the OECD average and variance of a country's scores relative to the average OECD variance) and their size represents the value of the third variable (social mobility in the school relative to the OECD average). This approach differs from the conventional approach taken by the OECD, which compares school systems on two dimensions: average performance (higher or lower than the OECD average) and intensity of social gradient (greater or lower than the OECD average)[20]. The data used combine five successive waves of PISA tests between 2003 and 2015. For each country, we calculate the average, across the five PISA tests, between average performance, inequalities in academic performance and interdecile mobility (always

19. To clearly illustrate how social mobility in schools is distinct from school inequality, let us take two school systems, A and B, with the same inequality in achievement between students. Let us also assume that they are equivalent in terms of average performance. However, school system A is characterised by a total lack of social mobility in schools: i.e., the academic position is completely determined by the student's social position. Conversely, school system B is characterised by perfect social mobility, which means that the student's academic position is completely independent of social position. It seems essential to take into account this difference in evaluating the two school systems, regardless of their performance and distribution of academic achievement. This is what we will do now.

20. See OECD 2014a, Figure II.1.2.

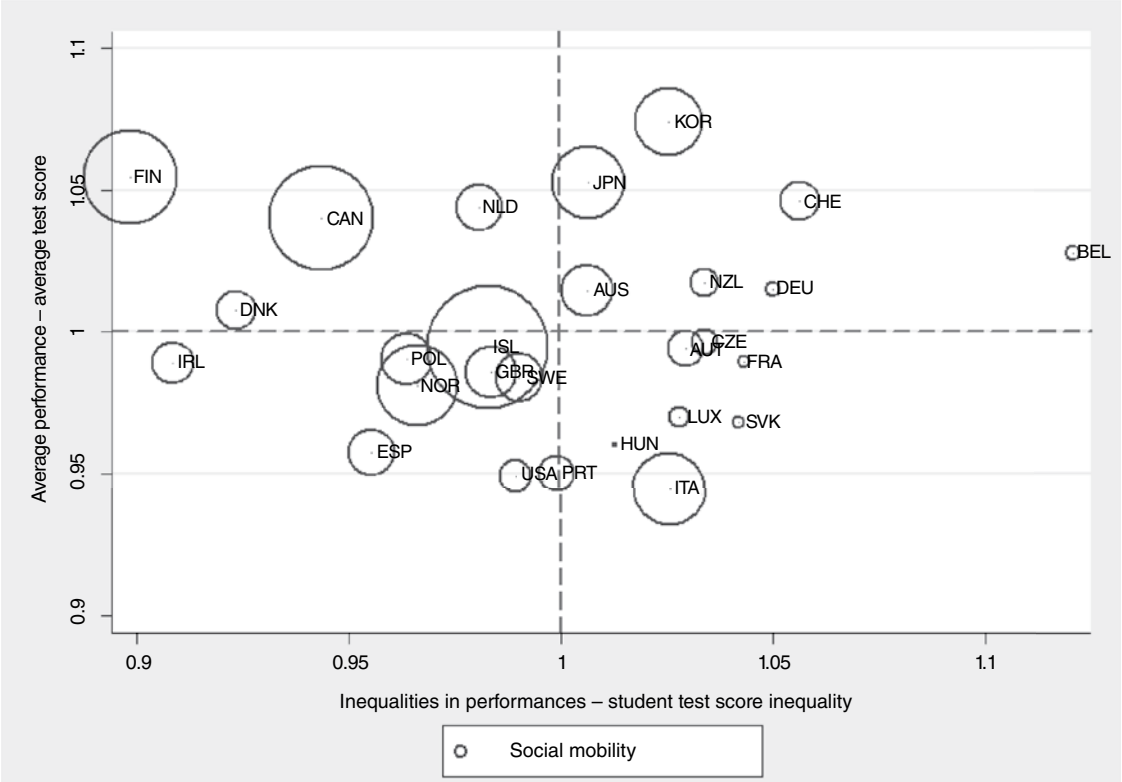
using the student weights). The size of the bubbles is larger above the horizontal line, which illustrates a form of synergy between performance (average achievement) and social mobility in schools (interdecile mobility index), and to the left of the vertical line, which illustrates a synergy between equality in academic achievement and social mobility in schools (figure IV). It can also be very clearly seen that a country like France is characterised by low social mobility, high income inequality and low average performance. Conversely, a country such as Canada combines high social mobility with low income inequality and a high average performance level.

Here, we analyse in greater detail the link between social mobility in schools and average performance. Studies from the OECD have often highlighted the fact that performance and equity in the sense of intensity of social gradient are not contradictory. Out of the twenty-three countries displaying performance above the average in mathematics on PISA 2012, twenty have a social gradient that is equal to or less than the average (OECD, 2014a, pp. 27–28). We would like to check this result for the social mobility index based on the five waves of PISA surveys in 2003-2015.

School performance

For each country, we calculate its average performance on mathematics tests based on all PISA tests between 2003 and 2015 and the average social mobility index over the same period. We then compare these two average indices (Figure V). The result is that social mobility and performance are positively correlated. Countries with better performing educational systems are often countries where social mobility in schools is higher. This result confirms the OECD's findings as to the link between the intensity of the social gradient and average performance. In addition, to our knowledge, the OECD's studies do not give a precise correlation between these two indicators. In our

Figure IV
Average test score, test score inequality and social mobility (PISA 2003-2015)



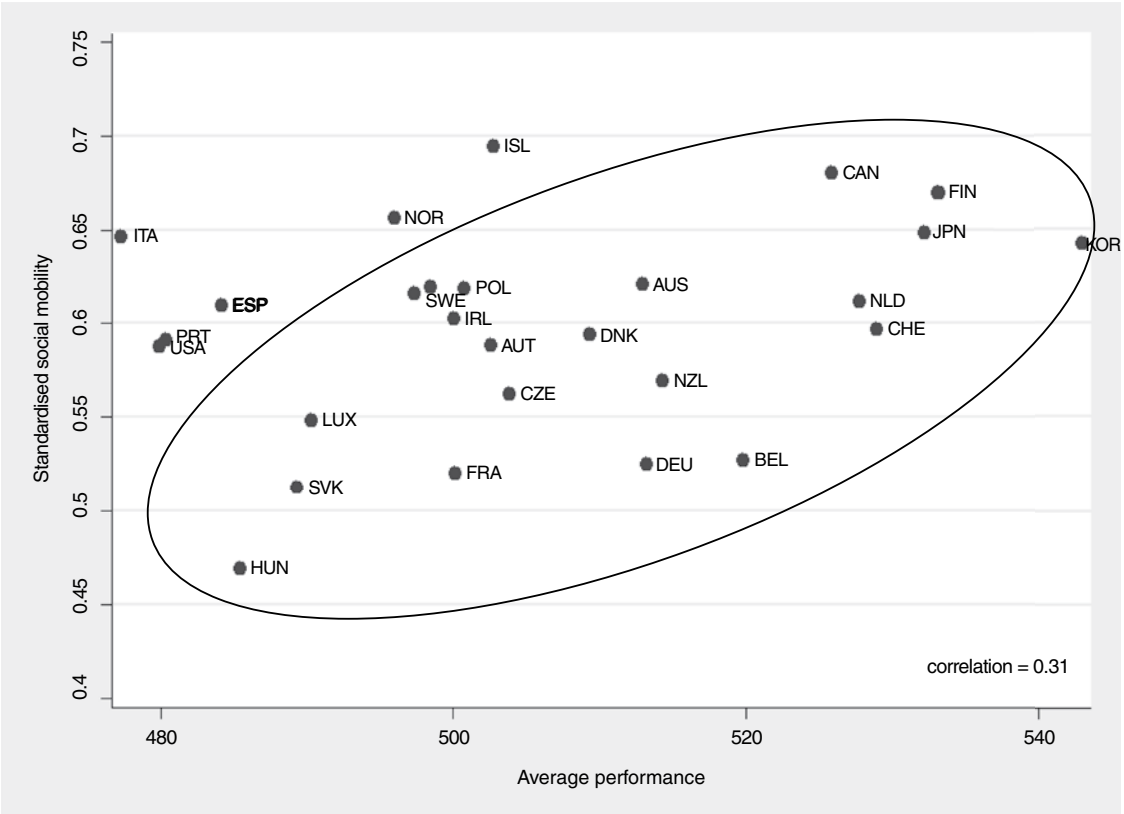
Note: The horizontal axis shows the test score inequality between students in each country relative to the OECD average. Test score inequality above 1 indicates above-average inequality in that country and vice versa. The vertical axis indicates the average test score in mathematics in each country relative to the OECD average. Performance above 1 indicates a country performing above the OECD average. The size of the bubbles indicates the normalised social mobility (figure II).
Scope: 27 OECD countries participating in the 2003-2015 PISA surveys.
Source: OECD, PISA 2003-2015 in mathematics; authors' calculations.

case, the correlation between social mobility and average performance across all PISA 2003-2015 surveys is + 0.31. How should this positive correlation be interpreted? As stated in the introduction, it is important to be careful in interpreting the results, precisely for two reasons. Firstly, our correlation is not a causality. Secondly, this correlation is a result aggregated at the country level, which rules out the possibility of a potential conflict between performance and equity at the more disaggregated level (in particular due to selection of students across schools). Taking into account these reservations, one possible explanation of the connection between performance and social mobility is that a policy of equal opportunity makes it possible to open up the "pool of talents" among working-class children, which then improves the overall performance level.

Our interpretation of the connection between performance and social mobility is based on the classic methodological individualism hypothesis in economics according to which facts and social processes need to be understood as the addition of behaviours and individual representations. This concept of "cognitive rationality" offers, in our view, a possible interpretation of our relationship between performance and social mobility. In a school system where children have equal opportunity for academic success, trust in individual action is greater and everyone is encouraged to invest fully in their schooling. In contrast, in a school system where a student's chances in school are highly correlated to social origin, the school becomes a place of "learned helplessness" for the children from working-class neighbourhoods. The consequence is a lack of motivation and academic performance.

The positive relationship between performance and social mobility should be considered as an extension of the results often repeated in the OECD's studies, indicating a possible complementarity between equity and school system performance. Freeman *et al.* (2010) have shown the existence of a similar virtuous

Figure V
Social mobility and academic performance (PISA 2003-2015)



Note: The average performance is the average of test scores in mathematics on the five successive waves of PISA surveys (using student weights). Normalised social mobility is identical to that in Figure II.
Scope: 27 OECD countries participating in the 2003-2015 PISA surveys.
Source: OECD, PISA 2003-2015 in mathematics; authors' calculations.

circle between equity and performance, based on an international comparison of standardised tests in mathematics, Trends in International Mathematics and Science Study (TIMSS), between 1999 and 2007 for a total sample of more than 250,000 students in grade 8 (13-14 years). However, in their analysis, equity is measured by the equality of academic performance and not by social mobility. A final question must be raised regarding the link between performance and social mobility. Is this correlation robust when the set of countries considered is extended beyond the OECD countries? While such an extension is possible, the results need to be qualified for two reasons. Firstly, the PISA socio-economic index was built exclusively for the countries of the OECD and not for partner countries (Rutkowski & Rutkowski, 2013). Secondly, the heterogeneity of the participating countries, whose educational or cultural traditions, as well as economic living conditions, can be very different, makes comparison with our reference countries (OECD) less reliable. Ollinger (2017) estimated the relationship between social mobility and performance based on achievement in mathematics for 44 countries having participated in PISA 2015 with a human development index comparable to that of the OECD countries. He found a correlation close to zero between performance and social mobility (see Ollinger, 2017, figure 9). However, this is not so surprising given that the 17 additional countries are, on average, less developed than the 27 in our reference group: their performance level is lower whereas their interdecile mobility index is higher (but less reliable: interdecile mobility is higher in Russia and Montenegro than in Canada or Finland), which drives down the correlation between performance and social mobility.

This leads us to question the link between educational inequalities and social mobility. As explained above, the OECD studies do not really examine this link between inequality and equity insofar as their equity index (based on the intensity of the social gradient) is mathematically dependent on educational inequalities (see equation 1). More educational inequalities mechanically reduces the intensity of the social gradient and thus the level of equity as defined by the OECD. Inversely, our index of equity (based on social mobility) is mathematically independent of educational inequality (as the distribution of test scores is transformed into a uniform distribution, in decile). The empirical results presented in the following section are therefore new.

The Great Gatsby curve

The controversy over the Great Gatsby curve

Alan Krueger (2012) popularised, in a speech at the Centre for American Progress, the expression "*The Great Gatsby Curve*" in reference to the inverse relationship between intergenerational mobility of incomes (measured by the intergenerational elasticity of labour income between fathers and children) and economic inequality (measured by the Gini coefficient on labour income). This empirical finding inspired by the work of Miles Corak (2013) has stirred some controversy. First of all, in the public opinion, because it contradicts the American dream that economic inequality is not an obstacle to social mobility. If economic inequality reduces social mobility, then growing inequality limits the possibilities for individuals to escape their fate. This is the tragic tale of Jay Gatsby, summarised in the closing lines of F. Scott Fitzgerald's work: "*So we beat on, boats against the current, borne back ceaselessly into the past.*" The Great Gatsby curve has also raised debate in the academic world. As Corak suggested from the outset, this correlation is not a causality. It furthermore relies on fairly strong hypotheses regarding the measurement of income between different generations (Corak, 2013). More surprisingly still, Corak *et al*. (2014) have shown that this correlation might simply not exist altogether. The Great Gatsby curve is "intrinsically biased" by the fact that it uses intergenerational elasticity in income as a social mobility index. As a result, by construction, an increase in income inequalities between generations mechanically increases intergenerational elasticity, thereby reducing social mobility. If, inversely, social mobility is measured with rank-order, by construction independent of income distribution, the relationship between social mobility and income inequality falls sharply. In reality, Corak *et al*. (2014) show that Sweden, Canada and the United States have relatively similar social mobility, while income inequalities are very different between these three countries, thus invalidating the Great Gatsby curve in income. We are now revisiting this Great Gatsby Curve for education, comparing the inequality of academic achievement to our social mobility index in schools.

The Great Gatsby curve in schools

In this section, we compare interdecile social mobility in schools and educational inequalities

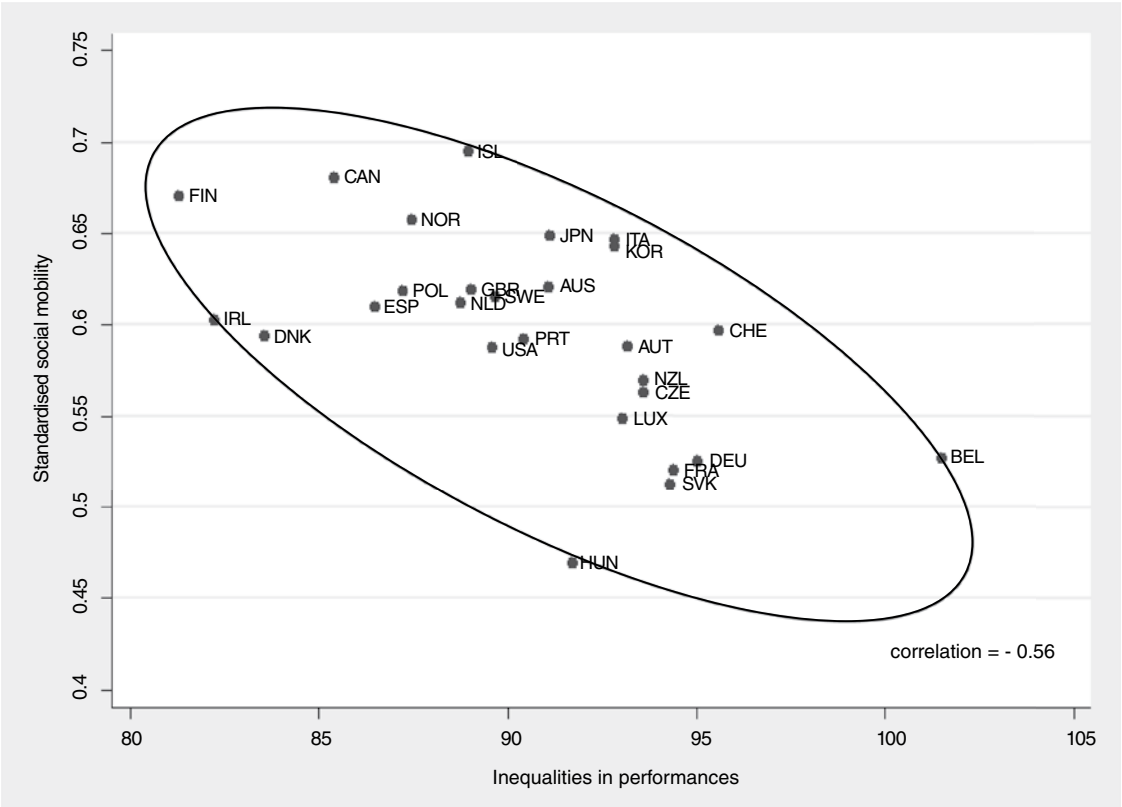
between countries. For each country, we calculate the average interdecile mobility index over the period and test scores inequality between students (always using student weights). The result is a negative correlation of - 0.56 between interdecile mobility in schools and standard deviation in test scores (Figure VI). This relationship is particularly worrisome in that it concerns the capacity of the school system to promote social mobility in the presence of educational inequality. It also puts into perspective the political division on equality of opportunity and equality of outcomes. Both forms of equality appear to reflect two faces of a same reality.

Interpreting the inverse relationship between mobility and educational inequalities is difficult, because we have only a correlation and not a causal relationship. We thus cannot claim that academic inequalities reduce social mobility in schools. What we can establish is that school systems with low educational inequality are also often characterised by greater social mobility in schools. A possible (and not final) way to interpret this relationship is related to the vertical differentiation among schools. In reality, using Theil decomposition and for each country, we calculated the between-school share of the student test scores inequality, the other part representing within-school inequality[21]. By superimposing this inequality between schools with social mobility in schools, we found a negative correlation of - 0.55 (Figure VII). This relationship suggests that those school systems with "vertical differentiation" in schools, as is the case in Germany or Belgium, have less social mobility than school systems with "horizontal differentiation" as in Canada or Finland[22].

21. France has been removed from this part of the analysis due to its separation between lower and upper secondary school students, at age 15. "Late" students remain in lower secondary school and are therefore automatically separated from "on-time" students who are in upper secondary schools. This situation, which is specific to France, accentuates inequalities between schools. In the other countries, the age at which students normally move from lower to upper secondary schools is 16 (e.g. "Gymnasium" in Germany, Austria, Netherlands, Switzerland and Central European countries).

22. By "vertical differentiation", we mean a segmentation of schools by academic level of students, and by "horizontal differentiation" we mean segmentation of schools according to the pedagogical approach or the school project.

Figure VI
The Great Gatsby curve of students inequality (PISA 2003-2015)

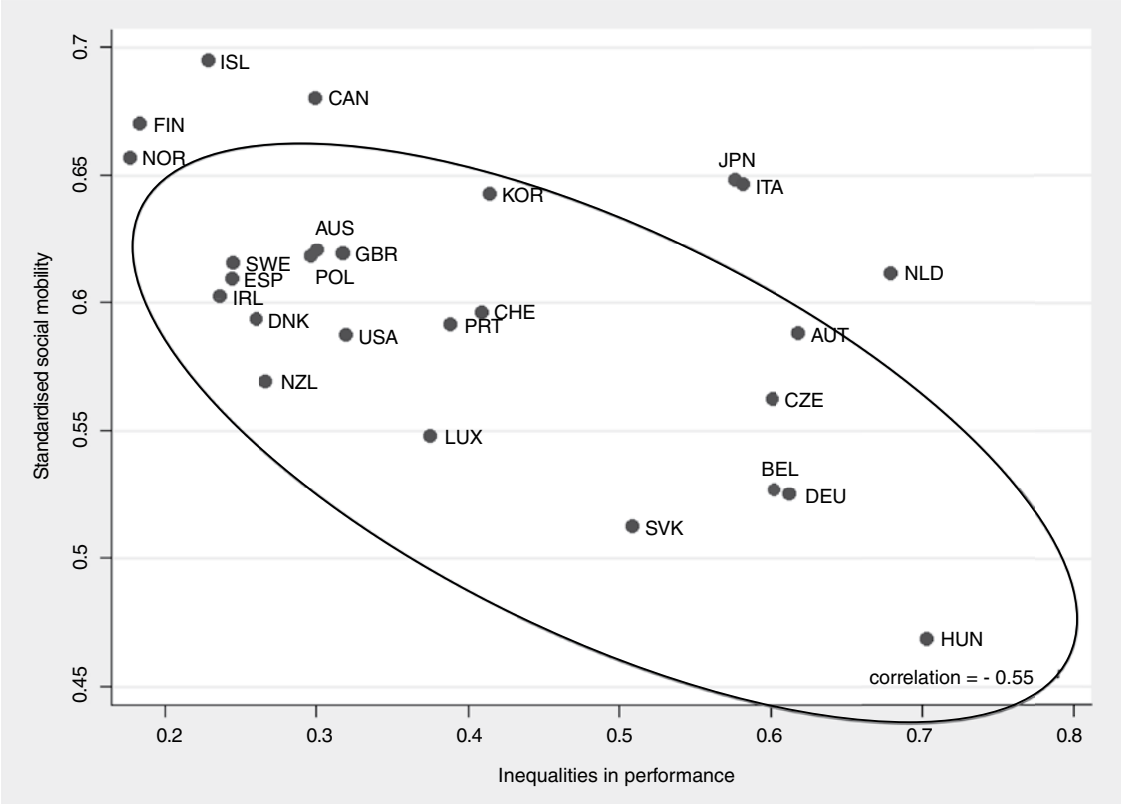


Note: Inequality of test score between pupils is measured by the standard deviation of pupils' test scores in PISA tests (with student weights). Normalised social mobility is identical to that in Figure II.
Scope: 27 OECD countries participating in the 2003-2015 PISA surveys.
Source: OECD, PISA 2003-2015 in mathematics; authors' calculations.

Mankiw (2013) criticised the interpretation of the Great Gatsby curve by suggesting that the inverse relationship between inequality and social mobility is due to the greater social heterogeneity of the more unequal groups. In a heterogeneous group with high inequality, social mobility would, according to him, be lower. This criticism is rejected by our comparison of school systems as social heterogeneity (measured by the dispersion in the socio-economic index of students) and academic inequalities (measured by the dispersion of results in mathematics) are not correlated among the countries considered. In our PISA sample, this correlation is actually null (- 0.01 between 2003-2015). Another criticism of Mankiw (2013) concerns the selection by talent, which he depicts using the metaphor of the chess players. It seems obvious that a group including both "novices" and "masters" will have less mobility (only the masters will win) than groups where novices and masters are separated (everyone has a chance to win). By separating players into groups of differing levels (ability grouping), mobility is encouraged within each group. This criticism of the selection by talent group is relevant at the level of the schools, but is no longer so at the country level. In fact, the opposite proves to be true at the country level: school systems with ability-grouping, as is the case in Belgium, are also those that display low social mobility. In contrast, school systems such as Canada's, without ability-grouping, have high social mobility[23]. Ultimately, what our Great Gatsby curve reveals is that the link between inequality and social mobility in schools lies in the complex alchemy within each school system and not in pseudo-differences in social or talent-related disparities between countries.

23. *The detailed results are available upon request.*

Figure VII
The Great Gatsby curve of school inequality (PISA 2003-2015)



Note: Inequality between schools is measured according to a Theil decomposition, as the share of inequality in students' test scores between schools, as opposed to inequality within schools. Normalised social mobility is identical to that in Figure II.
Reading note: France has been removed from this part of the analysis due to the separation between lower and upper secondary school students, at age 15. The "late" students are in lower secondary school and the "on time" students are in high school, which widens inequalities between schools.
Scope: 27 OECD countries participating in the 2003-2015 PISA surveys.
Source: OECD, PISA 2003-2015 in mathematics; authors' calculations.

Questions can be raised as to the robustness of this Great Gatsby curve by enlarging the set of countries studied. Ollinger (2017) recently confirmed this correlation between social mobility and educational inequality for a larger group of developed countries (44 countries, including the countries of the OECD) based on mathematics results in the PISA 2015 test, but also based on the results in science and reading. The Great Gatsby relationship proves even robust when the country perimeter is extended to include the 72 countries participating in PISA 2015. Ollinger (2017) also calculated the correlation between the intensity of the social gradient and the inequality between schools (as defined before). Based on PISA 2015 (with 44 countries), he found a positive correlation of 0.34 in mathematics, 0.44 in science and 0.43 in reading. On our side, on the basis of our wider PISA 2003-2015 sample (for the 27 countries) we have confirmed the Great Gatsby curve with correlation rates in science and reading comparable to those found in mathematics.

* *
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Comparing school systems requires characterising them with precision. Drawing upon the literature, we analyse school systems taking account of three dimensions: average student performance, educational inequalities and social mobility in schools. The originality of our study stems from our ordinal approach to social mobility. In this article, we show that contrary to the education equity indicators used by the OECD, the interdecile social mobility indicator enables social mobility to be studied independently of the other two dimensions: school inequalities and average performance in schools. This new angle for approaching social mobility in the school yields new results.

Based on PISA tests between 2003 and 2015 in the OECD countries, we have shown a strong relationship between social mobility and educational inequalities, which we call the Great Gatsby curve in schools. The social mobility of a school system therefore appears to be closely linked to school inequality. Countries such as Belgium or Germany, with high inequality between schools, are also characterised by low social mobility in schools. In contrast, countries such as Poland or Canada, with less inequality between schools, display higher social mobility in schools. In the former case, it can be said that the vertical differentiation model applies to schools, while in the latter case, the horizontal differentiation model is in play. The second finding of our study is that social mobility and school system performance more often go hand in hand than diverge.

Our study reveals that while countries have all adopted measures and policies to promote equality of opportunity in schools, some have achieved their aims far better than others. Our analysis, by comparing different school systems, also shows that change can be achieved without pitting excellence against equity or equality against social mobility in schools. Such an outcome should encourage politicians to go beyond ideological positions to address the issue of the quality of education in a pragmatic and practical manner. Our study also has a number of limits. While it highlights new associations between educational attainment, educational inequality and social mobility by comparing different school systems, it does not establish any causalities. In addition, our results are tightly conditioned by the quality of the PISA data, in particular that of the specific sample of 15-year-old students.

Various developments in different directions are underway. First of all, we are currently continuing our investigation of social mobility, carried out so far at the aggregate country level (country comparison), by schools level comparison to identify schools with high social mobility and their common characteristics. Furthermore, our social mobility index should be submitted to a careful analysis of its normative properties and be compared with other possible indices of social mobility. □

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50% to the bachelor's degree... but how? Young people from working-class families at university in France

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Abstract – In France, the majority of baccalaureate holders enroll in university. Based on the panel of pupils who entered *collège* (secondary school for ages 11-14) in 1995, 70% of children whose parents are managers and professionals or in intermediate occupations obtain a bachelor degree vs. 52% of children whose parents are manual workers. With comparable social backgrounds, students of North African origin are less likely to get a bachelor degree. The differences in graduation rates are greater still between those with a vocational or technology baccalaureate and those with a general baccalaureate; those who got a baccalaureate "*avec mention*", a grade higher than a pass, are also more likely to obtain a bachelor degree, especially if they have never repeated a year. Inequalities in learning in primary education have an impact on entry into higher education and getting the bachelor's degree. Five educational pathways can be distinguished among bachelor graduates. The "respectable" pathways of general baccalaureate holders are the most frequent. Next come the "middle-of-the-road" trajectories, which are neither excellent nor poor. Also fairly frequent are the "second-chance pathways" of students from the technology and vocational education system. More well-known, the last two are also the least frequent: on the one hand, the fragile and difficult secondary pathways identified by Beaud; on the other the "*héritiers"* described by Bourdieu and Passeron, or rather nowadays, the "*héritières"*.

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In 2002, the reform to the French bachelor's, master's and doctorate system (*Licence-Master-Doctorat*: LMD) changed the organisation of French university education. It transformed the bachelor's degree, known as the *licence*, into a qualification awarded at the end of a three-year post-baccalaureate undergraduate course. The bachelor's degree was then included in the objective of ensuring that 50% of a generation graduate from higher education, set by the Framework and planning act for the future of education (*loi d'orientation et de programme pour l'avenir de l'école*) of 23 April 2005. In 2015, the French national strategy for higher education (*stratégie nationale de l'enseignement supérieur* – StraNES) increased this objective and made it more specific to ensure that 60% of a generation graduate from higher education, with 50% of those at bachelor's level. As a result, the proportion of higher education graduates has risen, accounting for 42% of pupils who entered the first year of *collège* (secondary school for ages 11-14) in 1989, 44% of those who entered *collège* in 1995 and, in 2015, 44.7% of 25-to-34-year-olds were higher education graduates in metropolitan France (French Ministry of Higher Education, 2017).

In France, a number of studies have documented changes in the selection of pupils from working-class backgrounds as higher education became more accessible to them. The hypothesis of a change to the selection system is applied both in the large-scale quantitative studies on baccalaureate holders and in those focused on university students. Looking over the long term, analysis of Labour Force surveys (LFS) shows that the primary reason for the social expansion of higher education between the cohort of the early 1920s and that of the second half of the 1970s is the increase in the length of education of girls and boys from agricultural backgrounds in relation to the rest of the population (Selz & Vallet, 2006). In the more recent second education boom (1990s), those with technology and vocational baccalaureates are the main victims of university selection (Blöss & Erlich, 2000). A cohort analysis of the data from the 2003 FQP (*formation et qualification professionnelle* – training and vocational qualification) survey highlights that "the evident democratisation of the baccalaureate has resulted in limited democratisation in the access to higher education" (Duru-Bellat & Kieffer, 2008). In the Academy of Lille, Convert (2003) shows that students from the working classes (primarily those whose parents are manual or non-manual workers) have, since that time, obtained baccalaureate results that are lower than those of children whose parents are in management, all other things being equal. Likewise, the Beaud and Pialoux survey (2001; 2002) on vocational baccalaureate holders enrolled in the first year of general programmes at a small university site in the provinces confirms that the many negative academic judgements accumulated by these students since *collège* was no longer preventing them from achieving a baccalaureate or enrolling in general programmes at university. Since then, the issue has been less that of self-selection by *lycée* (high school for ages 15-18) students from working-class backgrounds (Duru & Mingat, 1988) than that of their "under-selection" or of their academic level on entering university undergraduate courses.

In this new configuration, it appears necessary to consider the educational career – at *collège* and *lycée* – of children from working-class backgrounds. Poullaouec (2010) shows that children of manual workers are as likely as the children of managers to enter the general programmes at *lycée* as long as they have a good level of education on entering *collège*. Cayouette-Remblière and Saint-Pol (2013) noted the highly varied educational careers of working-class children in secondary education and the decisive role of "academic engagement" (*accrochage scolaire*) which they define as "the desire to remain on a more valuable programme than academic performance might allow, be it from the point of view of school officials or the objective requirements of those programmes." Broccolichi and Sinthon's analysis (2011) of students' choice of programme according to their academic trajectory draws attention to the limitations of findings of academic "over-" and "under-selection" of working-class children when these are only observed at a single point in their educational career (the baccalaureate, for example). In fact, with identical initial levels of academic performance, the risk of failure varies according to social background due to learning differentials which accumulate each year and increase at *collège* (Duru-Bellat, 2002).

However, several studies have also examined the restructuring of academic inequalities by observing changes in the educational aspirations of families and pupils. These works highlight the divide between an increasingly shared ambition to continue in education, and the

highly differentiated academic results among children of manual workers (Poullaouec, 2010) and those of immigrants (Vallet & Caille, 1996; Brinbaum, 2002). Immigrant families have high aspirations (Vallet, 1996; Brinbaum, 2002). More precisely, parents from North Africa have higher educational aspirations for their children than French or Portuguese parents (Brinbaum & Kieffer, 2005), and these aspirations have a positive impact on educational career (Brinbaum & Kieffer, 2009). Lastly, Cayouette-Remblière and Saint-Pol (2013) highlight the limitations of the hypothesis that these are systematically transposed to academic inequalities.

Few research has expanded on the student educational career study by linking it with studies on social and migratory origins. Academic achievement among immigrant children at secondary and higher education level is primarily seen among girls (Brinbaum & Kieffer, 2009; Brinbaum & Guégnard, 2012; Brinbaum & Primon, 2013). In the working classes, the majority of those who entered higher education during the second education boom were girls with "respectable" educational pathways (Hugrée, 2010). These backgrounds cannot be reduced to academic excellence in the working classes (Laurens, 1992), nor should they be confused with the difficult schooling marked by failure at undergraduate level of their male counterparts (Beaud, 2002; Beaupère & Boudesseul, 2009). Achieved by these female baccalaureate holders and perceived by the school as "respectable", these pathways mainly concern the academic experience of girls who, not significantly successful or unsuccessful at school, took general courses.

Studies into changes in academic and social inequalities after the second education boom have focused much on the secondary level (particularly the baccalaureate) and the start of university (particularly drop-outs in the first few years), either by combining information on the educational pathways with the effects of gender and social background, or to a lesser extent, comparing the aspirations of parents according to their migratory background and their children's actual education. Studies on educational inequalities in France remain focused on the baccalaureate or on access to higher education.

The new keystone of French education policy and a minimum objective to be achieved for students, including those from working-class backgrounds (Poullaouec & Hugrée, 2011), the bachelor's degree is still little known in the sociology of French education... unlike the CPGEs (preparatory courses for selective post-graduate schools known as "*grandes écoles"*) (Darmon, 2014). Naturally, the LFS series has provided a better understanding of the historical dynamics of the inequalities in access to higher education degrees, those higher than the bachelor's (Selz & Vallet, 2006), or degrees from the "*grandes écoles*" (Albouy & Wanecq, 2003). But no publication has yet shown the connections, and broken them down according to social background, gender and migratory background, between types of educational career throughout secondary school and success at university.

The objective of this article therefore is to fill out this fragmented knowledge on the routes leading to the bachelor's degree. We will look at the trajectories of baccalaureate holders at three key moments in their educational career: at the time they start university, during their first years at university and once they have obtained their bachelor's degree, using longitudinal data on the higher education of students who started *collège* in 1995 (Box 1). The goal is to understand how social and educational determinants are linked from the start of a student's education to the moment they obtain a bachelor's degree at university. Once the conditions for getting into and succeeding at university have been identified, five typical pathways to obtaining a bachelor's degree emerge.

Entering university

University at the centre of undergraduate higher education

In France, in the 2000s, nearly nine baccalaureate graduates out of ten enrolled in higher education. The year after the baccalaureate, 41% of young people who were continuing their studies in higher education were enrolled on a university undergraduate course, 28% in an STS (*Section de technicien supérieur*; *lycée* department offering two-year post-baccalaureate advanced technician courses), 12% in an IUT (*Institut universitaire de technologie*; an institute offering two-year post-baccalaureate technology courses) and 11% in a CPGE (*Classe préparatoire aux grandes écoles*). The social and migratory backgrounds of the

students are described using original nomenclatures that combine the occupations, nationalities and countries of birth of both parents. By expanding recent research discussing the effects of household composition (Baudelot & Establet, 2005; Amossé & Ponthieux, 2011), this study highlights the effects of highly differentiated resources – particularly within the working classes –, until now little described in the sociology of education. While access to higher education after the baccalaureate remains unequal, access to the various courses is all the more so according to social and migratory origins (Box 2). Working-class students take two main tracks: university, especially when at least one parent is a non-manual worker, and STSs, especially when both parents are manual workers (table 1). The differences between choice of programme also varies according to migratory background: young people of Portuguese origin are clearly over-represented in the STSs (46%) in comparison with those of French origin and even those of North African origin (27% and 34% respectively). However, they are four times less likely to go to an IUT than young people from the other groups. More young people of North African origin (approximately +10 percentage points) enrol in university programmes, while many would in fact like to take an STS course (Brinbaum & Guégnard, 2012). These results confirm the central role of universities in French higher education for baccalaureate holders, including those from higher-skilled working-class families. They also confirm the very socially selective nature

Table 1
Course followed after the baccalaureate according to social and migratory backgrounds and type of baccalaureate (%)

	University	STS	IUT	CPGE	Social Health	Other	Total
All	41	28	12	11	4	4	100
Social backgrounds							
Both parents are in management, professional or intermediate occupations	43	14	11	21	4	7	100
One parent is in management (the other is not working or is self-employed) or one parent is self-employed (the other is not working or is self-employed).	41	25	10	13	4	7	100
One parent is in management, professional or intermediate occupation, the other is a manual or non-manual worker	42	26	14	9	5	4	100
One parent is self-employed, the other is a non-manual or manual worker	37	35	16	5	4	3	100
Both parents are non-manual workers	40	36	11	4	7	2	100
One parent is a non-manual worker, the other is a manual worker	39	38	11	4	6	2	100
Both parents are manual workers	35	47	10	3	4	1	100
The father is a non-manual or manual worker, the mother is not working	45	39	9	3	3	1	100
The mother is a non-manual or manual worker, the father is not working	44	30	14	3	6	3	100
Neither parent is working	50	36	7	2	0	5	100
Migratory backgrounds							
French origin	39	27	13	12	5	4	100
North African origin	49	34	12	3	1	1	100
Portuguese origin	37	46	3	4	4	6	100
Type of baccalaureate							
General	55	7	13	16	4	5	100
Vocational	13	80	3	0	1	3	100
Technology	19	59	12	1	7	2	100

Reading Note: 41% of baccalaureate holders enrolled in university, 28% in an STS, 12% in an IUT, 11% in a CPGE.
Scope: Baccalaureate holders enrolled in higher education in the year following the baccalaureate.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

Box 1 – **The panel of pupils from the first year of *collège* in 1995 to higher education**

Carried out by the statistical services of the Ministry of Education (*Direction de l'Évaluation, de la Prospective et de la Performance* – DEPP), the panel followed, for a period of ten years, a representative sample of 17,830 pupils who entered the first year at a state or private *collège* (secondary school for ages 11-14) in metropolitan France in the 1995-1996 academic year. Obtaining a baccalaureate between 2002 and 2006, depending on whether or not they repeated a year in secondary education and on whether or not they took a vocational track, the baccalaureate holders were then followed by the DEPP and Insee in higher education for nine years, up to when they obtained a qualification equivalent to a five-year post-secondary qualification. They were then asked about the courses they had chosen, their choice of programme, the study conditions and the qualifications obtained.

Within this panel, 9,197 baccalaureate holders answered the question concerning their situation the year following the baccalaureate and 8,154 had enrolled in a course. Here, we keep only the 7,782 who had enrolled in higher education courses immediately after the baccalaureate. We then focus on the paths of 2,051 young people who entered university (excluding healthcare courses), *IUT*s (technological university institutes), *STS*s (higher technical colleges) or *CPGE*s (prep classes to *Grandes Écoles*) on programmes leading to a bachelor's degree. Finally, our study of the educational careers of bachelor's graduates focuses on 2,002 young people including all higher education entrants (*IUT*, *STS*, *CPGE*, etc.), including healthcare disciplines.

Bachelor's graduations are documented on 31 October of year *n* throughout the nine-year post-baccalaureate study based on the answers to the question on the qualification obtained in year *n*. At the end of the follow-up, all the students in the panel who declared (once or more) that they held a bachelor's (or a degree from an *IUP* – vocational university institute, created in 1992, or a *licence professionnelle* – one-year top-up bachelor's – created in 1999), are considered as bachelor's graduates.

Box 2 – **Definition of social and migratory backgrounds**

The French notion of "working classes"

In French social sciences, the term "*classes populaires*" has gradually replaced the term "*classe ouvrière*" (working class predominately made up of manual labourers) to define groups in a "social position that is dominated" and marked by "forms of cultural separation", particularly in terms of access to qualifications (Schwartz, 1998). This notion especially includes unskilled jobs beyond industrials workers like unskilled services jobs that are mainly occupied by women. In the vast majority of contemporary research it refers to the wage-earning working classes, in other words manual and non-manual workers (Alonzo & Hugrée 2010; Siblot et al., 2016). Certain authors sometimes include farmers or at least some of them (Gollac, 2005), while others advocate excluding "skilled" workers (Amossé & Chardon, 2006). The definition used here is the most common and includes manual and non-manual workers.

Social backgrounds

In quantitative public statistic or sociology works, the definition of working classes is most often based on the occupation of the "household reference person". In the questionnaire given to families in 1998, the first question helped identify who the child lived with. If the parents did not respond (in 14% of cases), the DEPP identified the pupil's parents or guardians from the information given in 1995 by the school directors. If the child lived with both parents, the father's occupation determined the household's socio-economic category defined by the Ministry. If the child lived with just one parent (most often the mother without a cohabiting partner), this parent's occupation was used. The limitations of such a construction are well known (Amossé & Ponthieux, 2011). It masks, in particular, highly varied situations within a given modality of the variable used to identify the social backgrounds of pupils. For example, where the socio-economic category of the household reference person is "non-manual worker", this may correspond to highly varied situations depending on the family configuration. There are two main cases. When the child lives with both parents, the father is often a non-manual worker in the civil service (in 38% of cases), in the police force or the military (22% of cases) or an office worker (25%) and their jobs are skilled and better paid than those of other non-manual workers. Male non-manual workers differ from female non-manual workers. And among the female non-manual workers, there is also a strong distinction. Where the mother is the child's legal guardian, she is also fairly often classed as a civil servant (33%), but more often as an office worker (35%). She also works more often as a service worker (childminder, home help, cleaner, etc.: 18%). The other situations (father the legal guardian of the child, child placed in social services, etc.) are very rare.

Ideally, it would be best to leave aside this notion of household reference person, use the occupational categories of the father and mother, separate out single-parent families, take into account blended families, etc. But the information available in the statistical source, the size of the sample and the need for legibility in the data processing makes this task impossible. A middle road has therefore been taken by focusing on the information provided by the parents' occupations. Here, the pupils' social backgrounds were constructed taking into account, as far as possible, the socio-economic categories of the child's mother and father, in order to describe, as a minimum, certain frequent social status combinations among working-class couples. Whether one parent is raising their child on their own or they are accompanied by a new partner, their occupation is still combined with that of the other parent, using the variables PCSMERE and PCSPERE developed by the DEPP. →

Box 2 (contd.)

To start with, ten categories were identified to describe the social position of the parents (Table A).

In this instance, "not working" means those with no occupation, excluding jobseekers and retirees (these are classed under the socio-economic category of their last job). As this category is the most heterogeneous from a social background point of view, it also includes parents whose occupations were not given, situations in which the child is living without their parents, as well as missing information on the father's occupation when the mother is the child's sole guardian. Self-employed includes farmers, tradespeople, shop owners and owners of businesses with at least ten employees. The purpose of this initial coding was to identify the core of the working classes (categories coded from 5 to 10) and to identify the intermediate situations around the working classes, particularly the boundary between the middle or dominant classes (3) and the self-employed (4). By highlighting the diversity of the working classes, the objective was to reveal certain social conditions for the possibility of obtaining the bachelor's degree rather than to draw boundaries between social classes. To paraphrase Baudelot and Establet, "consideration of the occupation of both partners tends more to define social backgrounds rather than the abrupt contours of the social classes which could hold identical positions in production relations" (2005, p. 43). Naturally, this view does not resolve all the issues. For instance, it cannot take into account the occupation of new partners in the case of blended families (this information is not in the questionnaires), it does not separate out single-parent families due to the lack of sufficient participants making it possible to differentiate between them according to the socio-economic category of the mother (the majority of them come under category 9 in which the mother is a non-manual or manual worker, and the father's occupation is unknown or not declared). Nor does this categorisation make a distinction between the gender of the parents, except in the working classes where a distinction is made between couples in which only the father is working (code 8) and those in which only the mother is working (code 9).

In the regressions, another social background coding that combined the occupations of both parents was necessary. Without straying too far from the objectives of the first coding, more robust effects were obtained by restricting the number of categories to six: the two parents in management, professional or intermediate occupations; one parent in management, professional or an intermediate occupation, the other self-employed; one parent in management, professional or an intermediate occupation, the other a non-manual worker, manual worker or not working; two self-employed parents or one self-employed, the other a non-manual or manual worker or not working; two manual worker parents or one a manual worker and the other not working; two non-manual worker parents or one non-manual worker and the other a manual worker or not working.

Migratory backgrounds

The 1995 panel is the first DEPP panel to collect the place of birth and nationality of the parents, which makes it possible to identify the children of immigrants, born in France to immigrant parents – that is, not of French nationality at birth and born outside France – and to compare them with the children of parents born French or in France. By convention, they are referred to as being of "French origin" in this text.

A migratory background variable was developed at family level using the place of birth and nationality at birth of both parents with the following categories: two parents of French origin, two immigrant parents from Portugal, two immigrant parents from North Africa, two immigrant parents from other origins, mixed couples (one immigrant parent, one parent of French origin). The internal differences in North African countries cannot be taken into account due to the small number of participants. This made it possible to compare young people of Portuguese and North African origin, the two largest groups. Where numbers did not allow otherwise, natives of Spain, Italy and Portugal were grouped under the heading "parents from southern Europe".

Table A
Social background of students entering university

%

	Relationships between the parents	Share
1	Both parents managers, professionals or in intermediate occupations	26
2	One parent in management (the other not working or self-employed) or one parent self-employed (the other not working or self-employed).	13
3	One parent manager, professional or in an intermediate occupation, the other a manual or non-manual worker	22
4	One parent self-employed, the other a non-manual or manual worker	6
5	Both parents non-manual workers	6
6	One parent a non-manual worker, the other a manual worker	14
7	Both parents manual workers	4
8	The father a non-manual or manual worker, the mother not working	6
9	The mother a non-manual or manual worker, the father not working	2
10	Neither parent working	1
	All	100

Scope: All young people enrolled in a university undergraduate course, surveyed the first year after their baccalaureate (excluding healthcare courses and IUTs).
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

of access to preparatory courses (Givord & Goux, 2007; Albouy & Wanecq, 2003).

Choice of programme in higher education is also differentiated according to student gender (Duru-Bellat, 1990). Twice as many young men enter preparatory courses than young women, who mostly enter university programmes (49% compared with 32% of men). This trend holds true regardless of social background. Most young people of Portuguese origin, both male and female, enrol in an STS. In contrast, most young people of North African origin of both genders go to university.

This table confirms that school streams at secondary education level broadly extends into higher education: the biggest difference can be seen in the vocational and technology baccalaureate holders, who mostly enrol in STSs with a few going to university, and general baccalaureate holders who primarily go to university and to a lesser extent CPGEs or IUTs.

Differentiated entries to higher education which involve social and migratory origins, gender and educational careers

To what extent can these differences in access to the various courses according to social and migratory backgrounds and gender be associated with differences in structures between populations (parents' level of education, family structure, etc.) or with the prior educational careers of young people? To answer this question, several multinomial logistics regression models (or unordered polytomous models) were estimated to explain access to the various higher education courses.[1] Polytomous models were chosen where the variable is qualitative and contains several unordered categories (the various courses). Once they have obtained their baccalaureate, students go on to enrol in different courses. This variable is noted as Y. Each student *i* belongs to one course *j* of four possible courses (CPGE, university, IUT, STS). The students are described by a set of k characteristics x_{i1}, x_{i2}, …, x_{ik}. The first multinomial *logit* model assesses the probability of a student, taking into account their x_{ik} characteristics, being enrolled on a course *j*, based on a linear combination of x_{ik}. In this model, the *logit* coefficients successively show the logarithm of the probability of being enrolled in a CPGE, at university, or at an IUT in relation to that of being at an STS, based on six categories of the social background variable, with the reference of one parent being a manual worker and one a non-manual worker.

These models were then estimated by successively taking into account the social backgrounds, migratory backgrounds, other socio-demographic characteristics and lastly the educational backgrounds and qualification of the person being studied. The next model (M1') only takes into consideration the variable for the migratory and geographic backgrounds of the young people and can measure inequalities between the various origins and the population of French origin (the reference situation). Other socio-demographic information is then added to the explanatory variables (model M2): the student's gender, the education level of each parent, the family structure, the mother's activity status and the type of family (four modalities), and the (current or past) presence of any siblings in higher education, which indicates a degree of socialisation and knowledge of the programmes and how they work. Access can vary according to the type of family, and particularly whether there are two parents or a single parent. Lastly, the mother's activity status has an impact on the link between young people's educations and occupations. This is described using three categories: working, not working but has worked, and not working and has never worked.

Prior educational career is introduced in a final model (M3), with both the academic level in the first year of *collège* based on four grades in the national assessments, the type of baccalaureate obtained (general, technology or vocational) and the result of the baccalaureate (indicator of academic level at the end of *lycée*). These variables are key factors for accessing higher education and its courses.

This approach reveals the gross and net effects of social and migratory origins on the differences in enrolment in the various higher education courses between the groups. Access to each of the programmes (CPGE, university, IUT) is explained using the reference enrolment in an STS. These models do not aim to model individual choices, but rather, by comparing, all other things equal, the characteristics of these education sub-populations at the time of entering higher education, they reveal the key differences in access to French higher education programmes.

1. For a presentation of this model and its properties, please refer to Afsa-Essafi (2003).

Access to the different higher education courses would appear highly correlated with the social backgrounds of young people with a hierarchy within the social positions (Table 2). Children whose parents are managers or professionals or in intermediate occupations have a higher probability of entering each of the courses rather than an STS compared with children of manual or non-manual workers. The same applies to the children of one parent who is in management, followed by children of self-employed parents (the odds ratios – OR – decline gradually).

Firstly, access to CPGEs is very unequal, with strong social-based selection: the children of managers are fourteen times more likely to access such courses rather than an STS than children of manual and non-manual workers. Children whose parents are manual workers have the lowest chance of entering a CPGE rather than an STS in relation to children of non-manual workers (model M1). Access to university is also significantly higher for children of the dominant classes; however, there is no significant difference between children of manual workers and non-manual workers. Access to IUTs concerns the top of the social hierarchy and to a lesser extent the children of self-employed people. Young people whose parents come from southern Europe (model M1') are significantly less likely to enrol in undergraduate university programmes and more likely to enrol in STS courses than those of French origin (OR = 0.55 and 0.12 respectively), while young people of North African origin are no different to the latter (OR = 0.97); however, they are significantly less likely to choose an IUT course (OR = 0.73).

The effects of social background, which has a significant impact on access to the different

Table 2
The determinants of the probability of entering higher education

	M1			M3		
	Entering University rather than an STS	Entering an IUT rather than an STS	Entering a CPGE rather than an STS	Entering University rather than an STS	Entering an IUT rather than an STS	Entering a CPGE rather than an STS
Ref. 2 parents are non-manual workers or one is a non-manual worker and the other a manual worker or not working						
2 parents in management, professional or intermediate occupations	3.01 ***	2.87 ***	14.7 ***	1.13	1.12	1.9 ***
1 parent in management, professional or intermediate occupation, the other self-employed	2.16 ***	1.97 **	9.24 ***	1.45 *	1.26	3.04 ***
1 parent in management, professional or intermediate occupation, the other a non-manual or worker or not working	1.59 ***	1.81 ***	3.37 ***	1.01	1.13	1.31
2 parents self-employed or one self-employed, the other a non-manual or manual worker or not working	0.93	1.27 *	2 ***	0.81	1.08	1.34
2 parents are manual workers, or one is a manual worker, the other not working	0.9	0.8	0.6 **	0.91	0.91	0.8
	M1'					
Ref. French origin						
North African origin	0.97	0.73 **	0.18 ***	2.63 ***	2.49 ***	2.73 **
South European origin	0.55 **	0.13	0.19 **	0.94	0.27 **	0.76
Other origins	1.6 **	0.82	1.07	2.68 ***	1.49	3.1 ***
Mixed	1.29	0.76 **	0.99	1.07	0.68 *	0.85
Others and missing data	1.1 *	0.76	0.64 ***	1.27	1.14	1.38 →

Table 2 (contd.)

	M1			M3		
	Entering University rather than an STS	Entering an IUT rather than an STS	Entering a CPGE rather than an STS	Entering University rather than an STS	Entering an IUT rather than an STS	Entering a CPGE rather than an STS
Ref. Men						
Women				1.6 ***	0.55 ***	0.44 ***
Ref. Father has a vocational qualification						
Father has no qualification or unknown				1.1	0.85	0.68 *
Father has a "BEPC" (school certificate acquired at age 14)				1.3 *	1.11	1.52
Father has a baccalaureate				1.08	0.91	1.06
Father has a higher education qualification				1.76 ***	1.34 *	2.52 ***
Ref. Mother has a vocational qualification						
Mother has no qualification or unknown				0.98	0.82	1.06
Mother has a BEPC				1.12	1.08	1.25
Mother has a baccalaureate				0.97	1.11	1.14
Mother has a higher education qualification				1.39 **	1.17	1.95 ***
Siblings in higher education (*Ref.* no)				1.15	1.37 ***	1.1
Ref. 2-parent family						
Single-parent family				1.32	1.27	1.3
Blended families				1.56 **	1.14	1.09
Other situations				1.62 **	1.07	2.23 **
Ref. Mother not working but has already worked						
Mother working				1.01	0.96	1.1
Mother not working				1.29 **	1.11	1.4 **
Ref. 3rd quarter in the first year of *collège*						
1st quarter in the first year of *collège*				1.2	0.79	0.95
2nd quarter in the first year of *collège*				1.21 *	1.03	0.82
4rd quarter in the first year of *collège*				1.45 ***	1.36 ***	1.66 ***
Missing data on the first year of *collège*				1.7 ***	1.16	1.84 **
Ref. Bac with a pass grade						
Actual grade not given				1.07	0.76 **	0.2 ***
"Fairly good" grade				1.18 **	1.52 ***	5.22 ***
"Good" – "Very Good" grade				1.63 ***	1.5 **	23.55 ***
Ref. Technology baccalaureate						
General baccalaureate				20.44 ***	7.6 ***	70.49 ***
Vocational baccalaureate				0.49 ***	0.18 ***	0.08 **

*=significant at 0.10; **=significant at 0.05; ***=significant at 0.01.
Reading Note: The table provides the odds ratios of the polytomous model. A young person whose parents are both in management, professional or intermediate occupations is 1.9 times more likely to enter a CPGE rather than an STS compared with a young person whose parents are both non-manual workers (or one is a non-manual worker and the other a manual working or not working), with the same socio-demographic characteristics and educational background. Due to lack of space, the table does not show the results obtained with model M2.
Scope: Baccalaureate holders enrolled in higher education in the year following the baccalaureate (excluding those enrolled in other courses or in healthcare programmes).
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

courses, are reduced when gender, parents' level of education, migratory background and family environment are added in model M2. Lastly, when information associated with prior educational backgrounds is added to the model, the effects of social background disappear most of the time, particularly within the various echelons of the working classes. This does not mean that social backgrounds are not involved, but their effect is absorbed earlier on, in the educational career, which are in turn highly correlated with social backgrounds. They remain significant for the upper social classes in accessing CPGEs. Choosing a CPGE, IUT or university programme therefore strongly depends on the type of baccalaureate obtained and educational career throughout secondary education. The negative effects of a migratory background disappear when social and family characteristics are introduced (model M2). Students of North African origin access university programmes and IUTs more often than students of French origin with the same social and family background. When, in addition, the type of baccalaureate and educational careers are controlled for, the effects of North African origin increase further across all types of programme, as significantly more of these students choose these programmes (rather than STS) than students of French origin (model M3).

Access to the various higher education programmes strongly depends on the type of baccalaureate obtained, and academic level at school, measured by the student's level in the first year of *collège* and then by the type of baccalaureate and the grade. General baccalaureate holders are significantly less likely to access each of the higher education programmes than technology baccalaureate holders do, unlike vocational baccalaureate holders. In these models, the effects of gender are very clear with comparable social and family environments and educational careers. Girls who, on average, have better educational careers and more often general baccalaureates are significantly more likely to choose undergraduate university courses over an STS than boys (OR = 1.6, model M3) and less likely to choose the other programmes (CPGE: OR = 0.44; IUT: OR = 0.55).

Undergraduate university courses, therefore, still attract the majority of baccalaureate holders after secondary school. Working-class students are divided between undergraduate university courses and STS courses, in varying proportions depending on class sections, but particularly depending on the programme followed at *lycée*. This is also the case for students of North African origin who are more likely to obtain a baccalaureate than those of French origin, even if these are less likely to be general baccalaureates (Brinbaum & Kieffer, 2009). All things being equal, the chances of entering university are greater for general baccalaureate holders, for baccalaureate holders whose parents come from North Africa, and for young women. This confirms Brinbaum and Guegnard's research (2013). It should be noted that academic results at the time of entering *collège* continue to have an effect up to this point in their education.

Obtaining a bachelor's degree at university

Whether they obtain it in three or more years, following a linear trajectory or otherwise, whether they then obtain other qualifications or otherwise, only 35% of students enrolled in a higher education course in France the year following their baccalaureate obtain a bachelor's degree, the majority having immediately entered an undergraduate university course, and the others after having started their post-baccalaureate education at an IUT or STS, or on a CPGE.

From the first year of university to the bachelor's degree: the apparent role of social and migratory background, and gender

This study will now focus on those who enter higher education through an undergraduate university course, excluding undergraduate healthcare courses, which rarely lead to the bachelor's degree, and IUT courses. 61% of such students achieve a bachelor's degree, be it in the programme they originally started in, or in another after changing. Social differences in obtaining the bachelor's degree are fairly high in undergraduate university courses (Table 3). Seven out of ten students whose parents are both managers, professionals or in intermediate occupations achieve the bachelor's degree. For students with one parent who is a manual worker or non-manual worker and the other not working, less than one in two achieve the bachelor's. In addition, there are further significant variations within the working classes.

In the very frequent case that one of the parents is a non-manual worker and the other a manual worker, 60% of students who enter an undergraduate course obtain a bachelor's degree. In other words, working-class students who obtain a bachelor's degree often come from families in which the parents are the most skilled of these social groups (Hugrée, 2010).

Only 51% of those enrolled in undergraduate university courses obtained a bachelor's degree among students with at least one immigrant parent, against an average of 61%. The inequalities associated with migratory background partly mask those borne by the working classes, since the majority of students with immigrant backgrounds belong to these social groups in this panel. This difference is strongly connected to the types of baccalaureate obtained. Baccalaureate holders with at least one immigrant parent and belonging to working class households are more likely to obtain technology or vocational baccalaureates, and when they do have a general baccalaureate, it is rarely "*avec mention*", with a grade higher than a pass (Brinbaum & Kieffer, 2009).

While more girls access university programmes, especially when they are from an immigrant background (idem), they are also more likely to graduate with a degree; all social backgrounds combined, 58% of boys and 63% of girls graduate with a higher education degree after having entered via an undergraduate course (excluding healthcare courses). This difference is greatest when one parent is a farmer, a tradesperson, or shop or business owner. This difference disappears when both parents are managers, professionals or in intermediate occupations. But it is also fairly striking in the working classes, particularly when both parents are non-manual workers (or just one of them is and the other is a manual worker or not working).

… and the influence of the baccalaureate and academic performance at school

Obtaining the bachelor's degree depends both on the "social" background and "academic" path of students. This is much more varied among students from the working class than among those from privileged backgrounds. The consequences of this heterogeneity in education among baccalaureate holders should not be underestimated. An initial difference separates general baccalaureate holders from technology and vocational baccalaureate holders.[2] The majority of the first group obtain the bachelor's degree, while the majority of the

2. The low number of vocational baccalaureate students in the higher education follow-up sample of the panel of pupils entering their first year of collège *in 1995 (n=71 enrolled at university the year following their baccalaureate, and n=16 for those having obtained a bachelor's degree) meant that they had to be grouped with the technology baccalaureate holders. The low number of vocational baccalaureate holders at this level of education doubles in the longitudinal follow-up. For vocational baccalaureate holders from the 2000s, it took two years after* collège *to obtain the BEP, then two years of vocational studies at* lycée *to obtain the baccalaureate; the latter were not affected by the "3-year" vocational baccalaureate reform of 2009.*

Table 3
Bachelor's degree according to student social background (%)

Both parents in management, professional or intermediate occupations	70
One parent in management (the other not working or self-employed) or one parent self-employed (the other not working or self-employed)	64
One parent in management, professional or an intermediate occupation, the other a manual or non-manual worker	62
One parent self-employed, the other a non-manual or manual worker	55
Both parents non-manual workers	56
One parent a non-manual worker, the other a manual worker	60
Both parents manual workers	52
The father a non-manual or manual worker, the mother not working	46
The mother a non-manual or manual worker, the father not working	47
Neither parent working	*40*
All	61

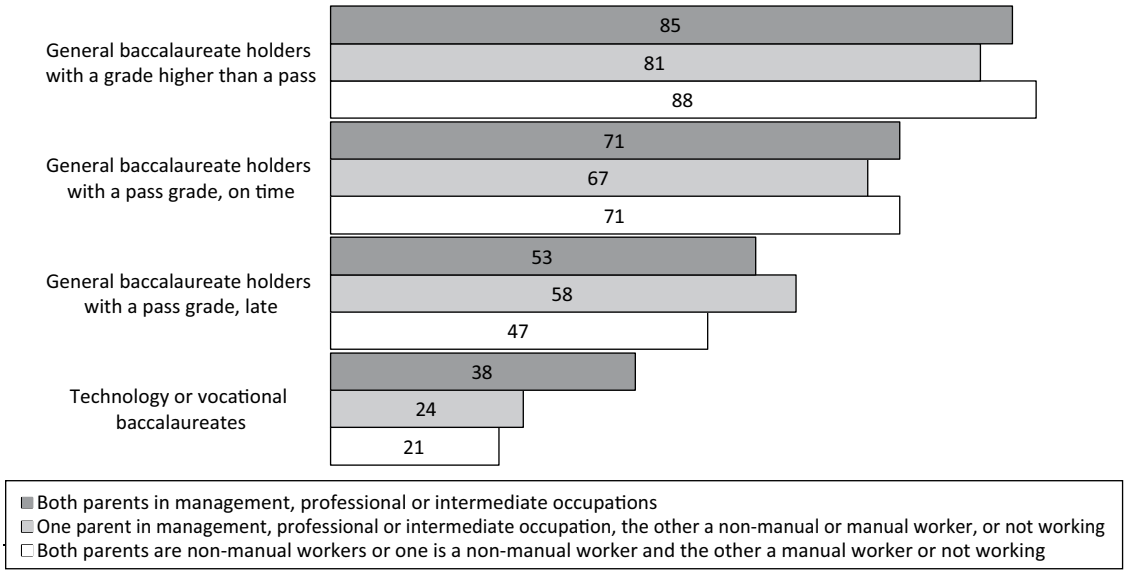
Reading Note: 52% of students whose parents were manual workers obtained a bachelor's degree. This is the case for 70% of the students of parents who were in management, professional or intermediate occupations. In italics, the percent is low due to the low number of participants.
Scope: All the young people enrolled in a university undergraduate course the first year after their baccalaureate (excluding healthcare programmes).
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

latter do not. But inequalities between general baccalaureate holders also create differences. Those with "*une mention*", a grade higher than a pass, in the general baccalaureate will nearly always obtain the bachelor's degree. Conversely, only half of general baccalaureate holders who repeat a year in secondary school achieve a bachelor's degree. The different ways to obtain a baccalaureate therefore prepare students very unequally for obtaining a bachelor's degree at university.

Given the variety of ways of accessing university education, it is worthwhile expanding on these conclusions by looking at the bachelor's graduation rates according to social background but with equivalent types of baccalaureate. Is a student who had a good academic level in secondary school less likely to achieve the bachelor's degree when they come from the working classes? No. After obtaining a general baccalaureate with a grade higher than a pass, 88% of students achieve a bachelor's degree when both parents are non-manual workers (or just one is and the other is a manual worker or not working), and 85% of children with parents who are managers, professionals or in intermediate occupations and with the same academic performance at *lycée* (Figure I). With a general baccalaureate obtained without repeating a year but with a pass grade, which is the modal situation in undergraduate courses (excluding healthcare courses), 71% of the first and 71% of the latter graduate with a higher education degree.

Although they do not enter university with the same baccalaureates, it is necessary to go back as far as pupils' assessments on entering the first year of *collège*. These shed light on the lasting and cumulative consequences of learning issues that have not been resolved in primary school on later educational careers, including undergraduate university courses. For instance, when their results in these French and maths assessments place them in the bottom quarter of *collège* pupils, only 37% of those enrolled in undergraduate university courses obtain a bachelor's degree. Conversely, 71% of those who ranked among the top quarter obtain the bachelor's degree. Naturally, students who are struggling the most at the end of primary school very rarely go on to an undergraduate university course. They only account for a very small minority of students enrolled the year following their baccalaureate (5%). Students whose results were in the second (16%) and third (31%) quarters

Figure I
Obtaining a bachelor's according to type of baccalaureate and social background (%)



Reading Note: 88% of young people enrolled in a university undergraduate course after having obtained a general baccalaureate with a grade higher than a pass obtain a bachelor's degree when both parents are non-manual workers, or one is a non-manual worker and the other a manual worker or not working. This proportion drops to 85% when both parents are in management, professional or intermediate occupation.
Scope: All young people enrolled in a university undergraduate course in the first survey (excluding healthcare courses). Due to the low number of participants, only three sets of social positions were used here. Also, the percentage of bachelor's graduates among technology and vocational baccalaureate holders is low once their social backgrounds are identified.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

in the assessments in the first year of *collège* are, however, higher in number. In these last two cases, the proportion of them that obtains a bachelor's degree remains below average. This link between academic performance in primary school and obtaining a bachelor's degree applies to all social backgrounds (Table 4). With comparable academic levels on entering *collège*, children of parents who are managers and professionals or in intermediate occupations are certainly more likely to obtain the bachelor's degree. But this advantage disappears in students who were among the top-achieving pupils at the end of primary school. Of those undergraduates who ranked in the top quarter of pupils having best benefitted from primary education, graduation rates are nearly identical. Conversely, it could be said that the benefit of a good primary education is a much more discriminating resource for children from the working classes than for those from the privileged classes.

In this instance, the "all other things being equal" logic can clarify the effect of each of the variables on obtaining a bachelor's degree for students enrolled in the first year of university (see Appendix 1). It is used in successive binomial logistic regression models showing this proportion, noted as Y, the dependent variable.

Each student *i* is described by a certain number of characteristics *X*, from *1* to *k*. The first model, M4, sets this number at 1: it only takes into account students' social backgrounds to assess the probability of obtaining the bachelor's degree (Y). The logit coefficient associated with each category of the social background variable expresses the logarithm of the probability that a student, accounting for their social background X_{i1}, obtains a bachelor's or not. The reference used to gauge, by comparing the respective influences of the different categories of explanatory variables, will be that of young men entering undergraduate university courses (excluding healthcare courses) after obtaining a general baccalaureate with a pass grade and without repeating a year, who were in the third quarter of pupils in the assessments in the first year of *collège*, and whose parents were of French origin, did not have baccalaureates and were non-manual workers (or one was a non-manual worker, the other a manual worker or not working).

Model M4 logically confirms the previous descriptions. When both parents are manual workers (or one a manual worker and the other not working), students are only half as likely to obtain a bachelor's degree compared with the reference (OR = 0.5). Conversely, students of parents in management, professional or intermediate occupations are 1.2 times more likely to obtain a bachelor's (OR = 1.2). As for the other social backgrounds, they do not seem to be linked with significant variations in this model. Model M5 only takes into account migratory backgrounds: it shows that students from immigrant families are less likely to obtain the bachelor's degree when their parents come from North Africa or southern Europe. When social backgrounds and

Table 4
Bachelor's degree according to social background and results in the assessments in the first year of *collège* (%)

	Both parents in management, professional or intermediate occupations	One parent in management, professional or intermediate occupation, the other self-employed	One parent in management, professional or intermediate occupation, the other a non-manual or manual worker or not working	Both parents self-employed or one is self-employed and the other a non-manual or manual worker or not working	Both parents are non-manual workers or one parent is a non-manual worker and the other a manual worker or not working	Both parents are manual workers, or one parent is a manual worker and the other not working	All
First or second quarter	*63*	*57*	*43*	*40*	42	*34*	43
Third quarter	68	*67*	57	63	52	*50*	58
Fourth quarter	71	*63*	72	70	72	68	71
All	69	63	62	61	57	49	61

Reading Note: 71% of students from a family in management, professional or intermediate occupations and who were in the highest-performing quarter of pupils entering the first year of *collège* obtained a bachelor's degree. This is the case for 63% of those in the lowest-performing half of pupils. In italics, the percentages are low due to the low number of participants.
Scope: All young people enrolled in a university undergraduate course in the first survey (excluding healthcare programmes) whose grades in the French and maths assessments in the first year of *collège* along with the parents' socio-economic categories are known.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

migratory backgrounds (M6) are simultaneously taken into account, the majority of the effects identified remain. In other words, with comparable social backgrounds, the students of North African families are less likely to obtain the bachelor's.

The next model (M7) gives a more thorough analysis by controlling not just for social and migratory backgrounds, but also the type of baccalaureate obtained by those enrolled in undergraduate university courses and their academic level on entering the first year of *collège.* Critical to studying the process of success at university, the secondary school experience is also more varied among students from working-class and immigrant backgrounds than those from other backgrounds. This is another reason for estimating the chances of obtaining a bachelor's degree, with equivalent social and migratory backgrounds, according to the type of baccalaureate, with a pass or higher, late or on time, and according to the results of the assessments in the first year of *collège*. Adding an indicator combining the type of baccalaureate, the grade achieved and any delays in achieving it greatly increases the model's explanatory power, to the extent that the regression coefficients associated with these categories practically become solely significant. As such, once social and migratory backgrounds have been controlled for, holding a technology or vocational baccalaureate cuts the chances of obtaining a bachelor's by a factor of five, compared with the reference. Conversely, holders of general baccalaureates with a grade higher than a pass see their chances of obtaining a bachelor's increased by a factor of 2.6. Likewise, academic performance on entering *collège* has a significant influence on the estimated probability of obtaining a bachelor's degree: all other things being equal, the students whose results in the assessments in the first year of *collège* placed them in the bottom or second quarters are less likely to obtain the bachelor's degree. These purely academic effects are not significantly altered by social and migratory backgrounds. Taking into account academic levels at the end of primary school and the type of baccalaureate obtained, the differences in achievement according to social and migratory background become much smaller. In particular, with a comparable social and educational background, students of North African origin do not have very different chances of obtaining the bachelor's degree compared with students whose parents were born in France. Once at undergraduate university level, it is as if the baccalaureate holder's chances of obtaining the bachelor's degree depends purely on academic performance in primary and secondary education.

Lastly, introducing the qualifications of the parents and gender of the student do not result in any major change (M8, not including the assessments in the first year of *collège*, but still taking into account social and migratory backgrounds and type of baccalaureate). When the effect of the parents' cultural heritage is measured by controlling for the type of baccalaureate obtained by the students, there are few significant variations: whether the parents have a baccalaureate or not, the important thing clearly seems to be that their children have a good secondary education background. This does not mean that the academic capital of young people has anything to do with the academic capital of the parents, but rather that this mainly has an effect earlier on, mainly at the start of the child's education.

Five typical pathways to graduates at university

Bachelor's graduates include students with different educational pathways; for instance, those who enter university straight after their baccalaureate (61%), who were the focus of the previous section. But some bachelor's graduates started their higher education with an IUT (15%), an STS (12%) and/or a CPGE (8%).[3]

When looking into the academic trajectory of all of these graduates, half of them (54%) entered *collège* with a good academic level – above the median in the assessments in the first year of *collège* – then obtained a general baccalaureate on time. The others either obtained their general baccalaureate late (15%) or a technology or vocational baccalaureate (10%). Only 15% of bachelor's graduates entered the first year of *collège* ranking among those with the lowest academic performance. While the academic and social selectiveness of the bachelor's degree is a fact, the variety of ways of obtaining one is also just as real. This variety of backgrounds primarily concerns working-class bachelor's graduates who obtain the degree in different disciplines

3. Those who followed a different course account for 3% of the participants.

and with different academic levels at school to those from the middle and upper classes.

A typology of the pathways of bachelor's graduates

Multiple Correspondence Analysis (MCA) on the variables characterising the secondary and higher education careers, study conditions and social backgrounds of all bachelor's graduates gives a joint representation of how studies at bachelor's level are organised and the social and educational careers leading to them (see Appendices 2 and 3). The decision was taken to combine all of these variables in the bachelor's graduates analysis in order to observe the effects of the "social inequality of the risks of non-achievement for a single initial education value" (Broccolichi & Sinthon, 2011, p. 22)[4]. An Ascending Hierarchical Classification (AHC)[5] was then carried out on the five leading factors resulting from the MCA (Figures II and III and Appendix 2 for details of the contributions). It reveals five typical backgrounds for bachelor's graduates, with highly differentiated social and educational backgrounds, and which reflect varied student experiences.

The MCA on the bachelor's graduates in the panel clearly shows the way in which their prior educational career, their social backgrounds and their study conditions are connected. Axis 1 opposes those with a technology or vocational baccalaureate or *licence professionnelle* (one-year top-up bachelor's degree), who have a poor academic level on starting the first year of *collège* (first and second quarters in the assessments in the first year of *collège*), and obtained a baccalaureate at least one year late and with regular paid work of more than 15 hours during their university course (to the right of the graph), to those who hold general baccalaureates (to the left). On the left, this same axis shows the bachelor's graduates who entered the first year of collège with a very good academic level (top quarter in the assessments in the first year of *collège*) and obtained their baccalaureate on time, and did not generally carry out regular paid work of more than 15 hours during their course.

The second axis opposes excellence to an entire range of academic respectability, central at this level of education (Hugrée, 2010). In this case, the bachelor's graduates who took a CPGE, obtained a "good" or "very good" in the baccalaureate, and did not carry out paid occasional or regular work during their course, are different to bachelor's graduates in the human and social sciences, economic and social administration (AES) and physical and sports sciences and techniques (STAPS) who obtained a general baccalaureate after repeating a year or retaking the exam and carrying out more or less regular paid work during their course.[6]

Five highly hierarchized pathways to obtaining a bachelor's

The classification that results from the factorial axes shows five types of educational and social backgrounds leading to a bachelor's degree in French universities in the 2000s (Appendix 4).

- The first class is the most singular and only encompasses 6% of bachelor's graduates. It concerns the bachelor's graduates with the lowest academic performance in French and maths on entering the first year of *collège* (40% of them were in the first quarter and 27% in the second quarter), who obtained their technology or vocational baccalaureate (45%) in 2004. Students born to immigrant parents are over-represented in this class, the majority are students with French parents. Students who

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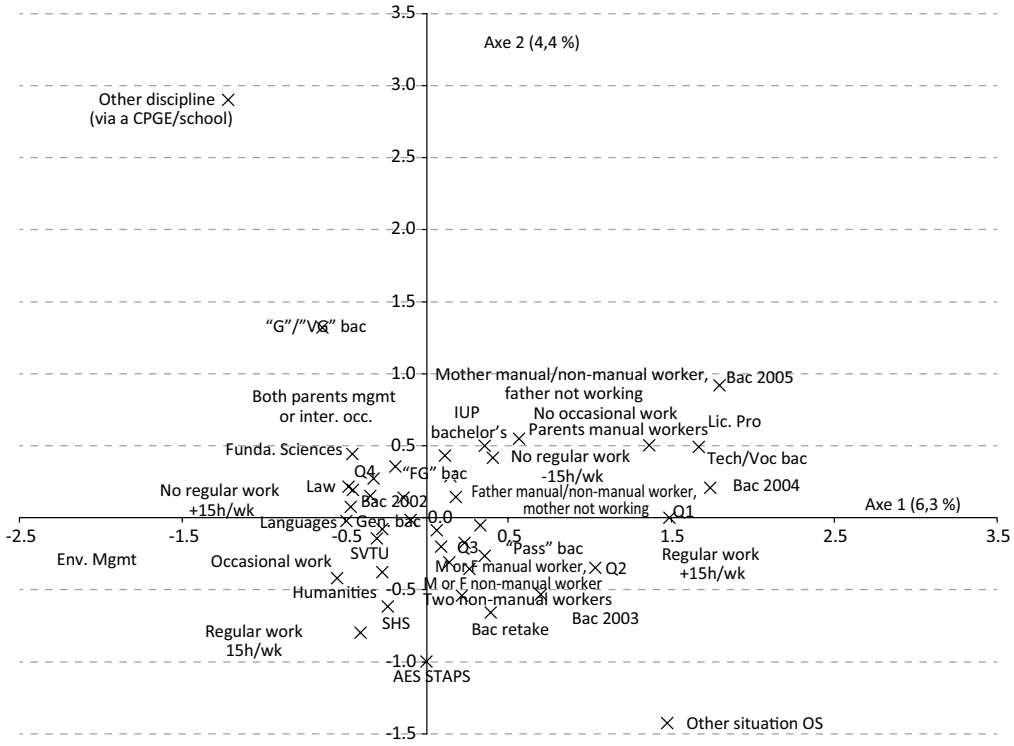
4. It is possible to compare the futures of the pupils with "the same educational profile according to their choice of course and their social background", particularly in "tangent" cases [at collège*] who were a year late and had an average grade of 9 out of 20 in maths and French"; a hypothesis that is transposed in this case to bachelor's graduates. The challenge of such reasoning is to avoid reducing access to the bachelor's to academic hierarchy alone. Only the analysis of the academic characteristics of the trajectories of bachelor's graduates gives an ordered unidimensional scale of bachelor's graduates going from the pupils who had the highest academic performance to those with the lowest academic performance at secondary school (Guttman effect). Yet, it is clearly because, at a comparable academic level on entering* collège*, academic trajectories then diverge according to social background that the variables of educational background, choice and social background should be combined in the analysis.*

5. An AHC based on Ward's criteria (strong interclass inertia and low intra-class inertia) was used without aggregating Forgy or k-means clustering, in order to explore different levels of partitioning (see Appendices 4, 5 and 6). Robette (2011) was used for the various statistical or empirical arbitrage opportunities associated with the number of classes in the different classification methods.

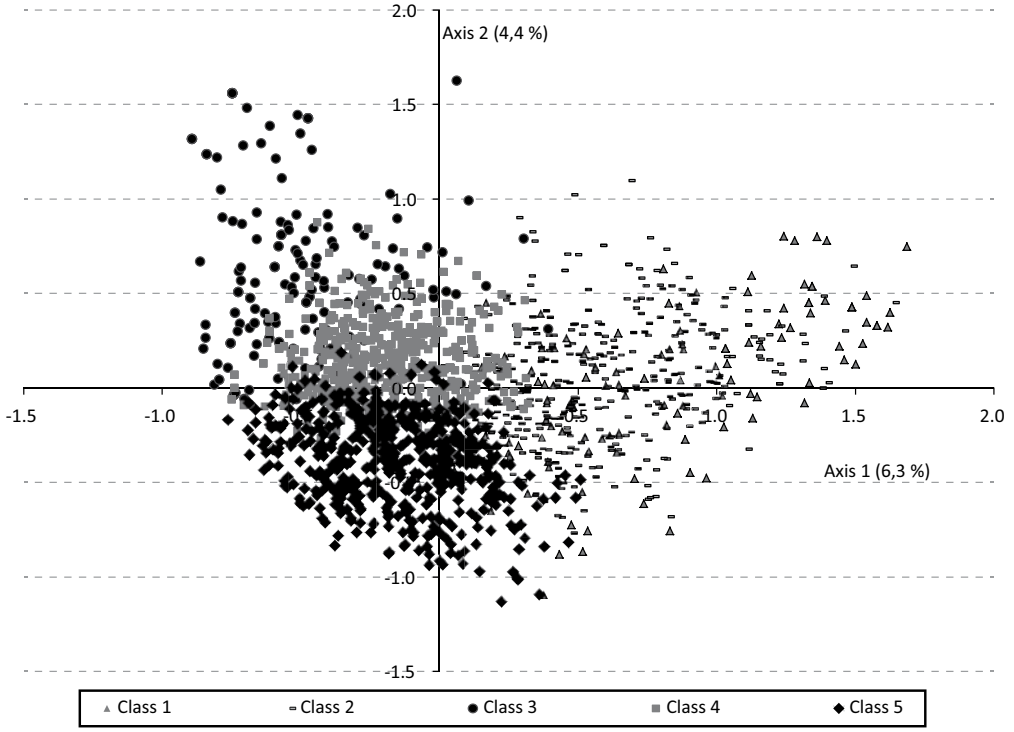
6. The following axes show this partition between educational careers based on university programmes or according to social backgrounds. Axis 3 compares the bachelor's graduates from Instituts Universitaires Professionnalisés *with those in fundamental sciences and those from other programmes but who first took a CPGE. Axis 4 compares bachelor's graduates in the humanities and SHS with those in science programmes, from working-class families in which the mother is not working. Class 5 separates out the bachelor's holders who were among the lowest-performing students on entering the first year of* collège *(q1) and whose parents were manual workers, and those who were among the second quarter in the assessments and from the middle classes (see Appendix 2). The decision to use five factorial axes not just because they provide a higher share of information than those theoretically provided by each of the thirty-three axes (of 3%), but also due to empirical considerations, particularly the overlap of certain comparisons identified by these first five axes.*

Figure II
Multiple Correspondence Analysis (graph of variables, axis 1 and axis 2)



Scope: All young people who entered higher education, including healthcare courses, who graduated with a bachelor's degree.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

Figure III
Multiple Correspondence Analysis (graph of individuals, axes 1 and 2 coded using the results of the Ascending Hierarchical Classification)



Scope: All young people who entered higher education, including healthcare courses, who graduated with a bachelor's degree.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

did not carry out regular paid work (- 15 hours/week) are over-represented in this group (54%). Evenly split between holders of *licences professionnelles* (one-year top-up bachelor's) and vocational and technology baccalaureate holders, this class of student resembles those that Beaud described as '*bacheliers par effraction"* (baccalaureate holders by break-in) (Beaud, 2002, p. 18) from the working classes and with difficult or poor secondary education pathways.

- Class 2 (21% of bachelor's graduates) is also primarily made up of those with a *licence professionnelle* (59%). Those with technology and vocational baccalaureates are present in similar proportions as in class 1, but in this case they are students with significantly different educational careers since the majority obtained a baccalaureate in 2003 (53%) and/or by retaking the exam (24%), and ranked among the second (26.5%) and third (42%) quarters in the assessments in the first year of *collège*. This class encompasses children of couples in which one is a non-manual worker and the other a manual worker (+ 5 points), one of the most frequent household compositions in France (Baudelot & Establet, 2005), as well as those from much rarer combinations such as one in management or an intermediate occupation and the other a non-manual worker or manual worker. We propose to call them the "second-chance students of the technology and vocational education system". The vast majority of students belonging to this class carried out regular paid work (+ 15 hours/week) before obtaining their bachelor's degree (84%). For the *licences professionnelles*, this can be explained by the work requirements of the course. The other bachelor's graduates in this group are similar to the students for whom work became "lasting to the point of gradually taking the place of academic studies" (Pinto, 2010, p. 63).

- Class 3 (8% of bachelor's graduates) is primarily students (see following point and Appendix 5), who graduate with a bachelor's following an excellent educational career. Males and females holding a baccalaureate with a "good" or "very good" grade (84%) at the end of a general baccalaureate course (96%), obtained on time (95%), predominate. For the vast majority of these, the female students entered *collège* with a good level of academic performance (83% of the members of this group were in the fourth quarter in the assessments at the start of *collège*). It mainly comprises graduates with bachelor's in fundamental sciences[7] along with students from the middle classes (28%) and upper classes (43%). Lastly, a major feature of this group is the absence of regular paid work in the first year of the university course (74%). In a context where girls predominate at school, this group of female bachelor's graduates can be seen as a modern-day version of the typical Bourdieu & Passeron's (1964) *héritiers* – male inheritors – now made up of *héritières* – female inheritors – (see Appendix 5).

- Classes 4 and 5 encompass two types of academically respectable backgrounds, which are the most frequent at this level of study, with:

- bachelor's graduates with "respectable" backgrounds (class 4, 33% of bachelor's graduates), particularly identified in works on higher education among the working classes (Hugrée, 2009, 2010);

- bachelor's graduates with "middle-of-the-road" backgrounds (class 5, 31% of bachelor's graduates).

The backgrounds of these two last classes are not to be confused with the academically excellent backgrounds seen in class 3, although a major portion of these bachelor's graduates come from the middle and upper classes. The "respectable pathway" class (class 4) is exclusively made up of general baccalaureate holders (99%) who obtained their baccalaureate on time (95%), and half of whom (50%) earned a "fairly good" grade. The majority of these also entered the first year of *collège* with a good academic level (76% of them were in the top quarter in the maths and French assessments). Many have parents in management, professional or intermediate occupations. Of the few bachelor's graduates from the working classes who have this type of background, the majority are students whose parents are both manual workers. These students are not generally part of the student workforce: 89% have not carried out regular work (-15h/week), 51% have not carried out seasonal work and 46% have not carried out regular work (+15h/week).

Class 5 have "middle-of-the-road" backgrounds, mid-way between success and failure,

7. As well as those included in the category "other programmes". This encompasses bachelor's graduates whose course nomenclature code was not given at the time of their bachelor's degree. Of those responses not provided, the bachelor's graduages known to have first done a CPGE were separated out from those whose bachelor's degree speciality remains unknown.

both in secondary education and in higher education. Those in this class have general baccalaureates (98%) with a pass grade (63%). Some of them obtained their baccalaureate in 2003 (28%) and belonged to the third quarter in the assessments in the first year of *collège* (35%). These trajectories include paid work in the first years of the course: 58% of them state that they worked regularly (-15 h/week) and nearly all of them (84%) worked occasionally during their course. This class primarily contains SHS, AES, STAPS and humanities students as well as a large proportion of students whose parents were non-manual workers.

These results show the significant differentiation in educational careers among bachelor's graduates, between academically excellent backgrounds, "respectable" backgrounds, and lastly the "middle-of-the-road" backgrounds. These last two types of pathways currently account for the majority of routes to obtaining a bachelor's degree at university and do just not concern students from the middle and upper classes, but also those from the working classes, particularly children of couples where both parents are working. They also show that the heterogeneity of the backgrounds of baccalaureate holders from the technology and vocational streams (Palheta, 2012; Cayouette-Remblière & Saint-Pol, 2013), is also visible in the bachelor's degree threshold.

Male and female students with highly differentiated futures

The typology clearly shows the ways in which educational careers, social background and study conditions combine together and clearly differentiate bachelor's graduates today. There is a clear divide between girls and boys in pathways leading to obtaining a bachelor's degree. Female students account for 63% of the "*héritières* – female inheritors" class, 65% of bachelor's graduates with "respectable educational pathways" and 68% of bachelor's graduates in the "middle-of-the-road" class. Conversely, they are in the minority in the "poor and difficult secondary school" careers and among the "second-chance" students of the technology and vocational education system (48% and 42%). More likely to obtain the bachelor's degree, girls also obtain it under conditions that make it easier for them to then access the highest degrees in the French higher education. Nearly half of the "female inheritors" and bachelor's graduates with "respectable pathways" then go on to obtain a degree at least equivalent to the Master (five years post-baccalaureate) compared with 37% of all bachelor's graduates (Table 5).

* *
*

Thirty years after the generalisation of access to *lycée*, this study draws a picture of an undergraduate university education that remains particularly socially selective. In France, the bachelor's degree now appears to be a new academic threshold which gives a clear advantage to general baccalaureate holders. But the bachelor's degree also reveals differences between the general baccalaureate holders, particularly according to their *collège* and *lycée*

Table 5
Highest degree obtained according to the education pathway (%)

	Bachelor's degree	Four-year post-bac qualification	Master's	Schools and other qualifications	Total
Class 1: Poor or difficult secondary educational pathways	72	10	13	*5*	100
Class 2: Pathways in which work became lasting to the point of gradually taking the place of academic studies	65	7	23	*5*	100
Class 3: The "*héritières*" (female inheritors) pathways	17	17	49	*17*	100
Class 4: Respectable educational pathways	33	14	47	*6*	100
Class 5: Middle-of-the-road pathways	40	14	41	*5*	100
All	45	12	37	*6*	100

Reading Note: 72% of bachelor's graduates belonging to class 1 "poor or difficult secondary educational pathways" have a bachelor's degree as their highest qualification. This is the case for 44% of all bachelor's graduates. The results in italics concern participant numbers that are too low for analysis.
Scope: All young bachelor's graduates.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

backgrounds. While failures experienced by certain students with working-class or immigrant backgrounds are borne out, not all of their trajectories are limited to this. Obtaining a bachelor's degree is seen more often among girls from the least disadvantaged sections of working-class families (dual-career couples, non-manual or skilled workers, often holding a CAP or a BEP, two-year post-*collège* qualifications). But the different ways of obtaining it also shows the obstacles experienced by many (primarily inequalities in prior learning). This typology therefore shows the most frequent backgrounds within the French university system. It particularly demonstrates the variety of ways in which working-class students approach this new must-have which is the bachelor's. At a time when debates surrounding entry to and success at university are at their most heated, this analysis identifies one of the main cruxes of the problem: families and young people are increasingly aspiring to a three-year post-baccalaureate qualification, even in the working classes, but there are inequalities in choice and achievement which mainly take root in the first years of education. More than ever before, the objective of democratising higher education is integrally linked with the fight against academic inequalities in primary education. As such, the major inequalities in educational backgrounds and achievement seen among bachelor's students is a major obstacle to success for the vast majority. Experience shows, however, that a good start in elementary learning practically cancels out the disadvantage of students from working classes. □

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	M4				M5				M6				M7				M8			
Reference situation in italics	%	Coef.	OR	α	%	Coef.	OR	α	%	Coef.	OR	α	%	Coef.	OR	α	%	Coef.	OR	α
Social position of parents																				
Management - Not working // Self-employed - Self-employed, Management, Not working	45	0.01	1.01	ns					49	-0.01	1.00	ns	57	-0.06	0.94	ns	54	-0.12	0.89	ns
1 parent in management , professional or an intermediate occupation, the other self-employed	44	-0.04	0.96	ns					48	-0.06	0.94	ns	54	-0.18	0.84	ns	52	-0.20	0.82	ns
Management, professionnal or ntermediate occupation - Management, professional or ntermediate occupation	55	0.41	1.51	***					58	0.34	1.41	***	58	-0.02	0.98	ns	56	-0.05	0.95	ns
1 parent in management, professional or an intermediate occupation, the other a non-manual worker, manual worker or not working	48	0.11	1.12	ns					51	0.08	1.08	ns	56	-0.11	0.89	ns	55	-0.08	0.92	ns
2 parents who are non-manual workers, or one a non-manual worker and the other a manual worker or not working	45	—	—	—					49	—	—	—	59	—	—	—	57	—	—	—
2 parents are manual workers, or one is a manual worker, the other not working	34	-0.45	0.64	***					42	-0.29	0.75	**	54	-0.19	0.83	ns	52	-0.20	0.81	ns
Migratory origin																				
Both parents are French born					52	—	—	—	49	—	—	—	59	—	—	—	57	—	—	—
Both parents are immigrants from North Africa					30	-0.92	0.40	***	34	-0.65	0.52	***	56	-0.12	0.89	ns	53	-0.17	0.84	ns
Both parents are immigrants from Southern Europe					36	-0.65	0.52	*	37	-0.50	0.61	ns	46	-0.49	0.61	ns	45	-0.50	0.61	ns
Both parents are immigrants from other regions					44	-0.33	0.72	ns	45	-0.19	0.83	ns	61	0.08	1.08	ns	55	-0.10	0.91	ns
One parent is French born, the other an immigrant					45	-0.30	0.74	*	42	-0.29	0.75	*	53	-0.22	0.80	ns	50	-0.29	0.75	ns
Missing data					39	-0.55	0.58	***	38	-0.49	0.61	***	49	-0.40	0.67	***	47	-0.40	0.67	***
Type of bac																				
General bac with a grade higher than a pass													72	0.62	1.86	***	72	0.65	1.91	***
General bac with a pass grade, on time													59	—	—	—	57	—	—	—
General bac with a pass grade, late													41	-0.70	0.50	***	39	-0.72	0.48	***
Technology or vocational bac													19	-1.80	0.17	***	17	-1.90	0.15	***

➔

	M4				M5				M6				M7				M8			
Reference situation in italics	%	Coef.	OR	α	%	Coef.	OR	α	%	Coef.	OR	α	%	Coef.	OR	α	%	Coef.	OR	α
Academic level in assessments in first year of *collège*																				
1st quarter													49	-0.40	0.67	*				
2nd quarter													52	-0.26	0.77	**				
3rd quarter													59	—	—	—				
4th quarter													61	0.09	1.10	ns				
Gender																				
Men																	57	—	—	—
Women																	59	0.08	1.08	ns
Parents' level of qualification																				
Neither parent has a bac																	57	—	—	—
Only the father has a bac																	55	-0.07	0.93	ns
Only the mother has a bac																	54	-0.12	0.88	ns
Both parents have a bac																	61	0.18	1.19	ns
Percentage of equivalent couples	46				34				54				71				71			

Number of observations: 2051. The results are successive regression logistics estimates carried out on bachelor's graduations.
*=significant at 0.10; **=significant at 0.05; ***=significant at 0.01.
Reading Note: 55% of young people whose parents are in management, professional or intermediate occupations obtain a bachelor's degree. This characteristic has a positive effect on the probability of obtaining a bachelor's degree (positive coefficient). So the odds (obtain/not to obtain a bachelor's degree) are 1.5 more likely for them than for young people whose parents are non-manual workers (or one is a non-manual worker and the other a manual worker or not working).
Scope: Baccalaureate holders enrolled in an undergraduate university course excluding healthcare courses, the year after the baccalaureate.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

APPENDIX 2

CONTRIBUTIONS OF THE ACTIVE VARIABLES TO THE INERTIA OF EACH OF THE FIRST FIVE AXES IN THE MULTIPLE CORRESPONDENCE ANALYSIS

%

	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
Belong to the 25% (q1) lowest-performing students in the assessments in the first year of *collège* (Fr & Maths)	2.66	0	12.3	2.78	15.82
Belong to the 50% (q2) lowest-performing students in the assessments in the first year of *collège* (Fr & Maths)	6.16	1.02	3.37	2.53	3.43
Belong to the 50% (q3) highest-performing students in the assessments in the first year of *collège* (Fr & Maths)	1.79	1.44	0.27	1.50	0.06
Belong to the 25% (q4) highest-performing students in the assessments in the first year of *collège* (Fr & Maths)	6.10	1.79	1.47	0.04	0.03
General bac	3.08	0.38	0.15	0.36	0
Technology/vocational bac	18.76	2.34	0.92	2.22	0.02
Bac 2002	4.12	1.10	1.35	0.02	1.15
Bac 2003	5.44	4.54	0.20	1.66	8.60
Bac 2004	5.94	0.12	9.73	7.51	7.19
Bac 2005	1.31	0.49	2.13	0.33	0.18
Bac with a “good”/“very good” grade	2.04	12.54	6.52	5.06	3.61
Bac with a “fairly good” grade	0.50	2.48	2.30	0.85	1.38
Bac with a pass grade	0.44	3.11	0.01	1.25	0.68
Bac retake	1.05	4.29	0.03	6.95	2.35
Bachelor’s AES STAPS	0	5.82	0.01	0.01	5.30
Bachelor’s in other programmes via a CPGE	1.59	13.06	3.47	3.55	5.79
Bachelor’s in other programmes	0.01	0.02	1.16	0.00	0.09
Bachelor’s in law	1.08	0.28	0.16	0.82	0.15
Bachelor’s in management and economics	0.02	0.12	0	0.20	9.48
Bachelor’s in languages	1.02	0	0.31	0.15	6.93
Bachelor’s in humanities	1.03	0.89	1.74	2.67	1.01
Licence Professionnelle	16.22	3.16	0.61	2.57	0.01
IUP bachelor’s	0.04	0.86	10.88	5.09	0
Bachelor’s in fundamental sciences	0.78	1.05	2.98	5.27	0.05
SHS bachelor’s	0.48	4.62	0.08	3.06	0.01
SVTU bachelor’s	0.29	0.09	0.26	5.57	3.02
No regular work +15h/wk	4.32	0.16	12.05	1.57	0.02
Regular work +15h/wk	3.06	0.11	8.53	1.11	0.01
No regular work -15h/wk	0.75	4.20	0.71	1.35	0.03
Regular work -15h/wk	2.07	11.66	1.99	3.76	0.09
No occasional work	2.63	7.40	1.20	1.23	0.02
Occasional work	2.00	5.64	0.92	0.93	0.02
Both parents are in management, professional or intermediate occupations	1.51	1.50	0.04	0.01	0.09
One parent is in management (the other is not working or is self-employed) or one parent is self-employed (the other is not working or is self-employed)	0.06	0	4.32	0.24	12.62
One parent is in management , professional or an intermediate occupation, the other is a manual or non-manual worker	0.04	0.12	1.48	0.74	0.02
One parent is self-employed, the other is a non-manual or manual worker	0.14	0.11	1.56	3.44	1.68
Both parents are non-manual workers	0.12	1.11	0.48	0.12	0.43
One parent is a non-manual worker, the other is a manual worker	0.43	1.13	1.67	0.75	0.72
Both parents are manual workers	0.31	0.46	0.61	0.13	5.51
The father is a non-manual or manual worker, the mother is not working	0.08	0.07	1.16	11.18	0.00
The mother is a non-manual or manual worker, the father is not working	0.23	0.31	0.42	2.78	0.37
Neither parent is working	0.31	0.42	0.46	8.61	2.04

2002 observations
Reading Note: The category “Belongs to the 25% (q1) lowest-performing students in the assessments in the first year of *collège* (French & maths)” is located to the right of the factorial analysis representing axis 1 and axis 2 (coord (1.03; 0.00). This category contributes 2.66% inertia to axis 1.
Scope: baccalaureate holders with a bachelor’s degree. Individuals whose high grade in the baccalaureate and results in the assessments in the first year of *collège* along with those whose social background (father and mother) were unknown were excluded from the analysis.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

APPENDIX 3

TYPOLOGY OF CLASSES OF TRAJECTORIES TO OBTAINING A BACHELOR'S DEGREE RESULTING FROM THE ACH

	Class/ Category (% in row)	Category/ Class (% in column)	All bachelor's graduates	p. value	v. test
Class 1 – "Poor / difficult" school career (6.2% of bachelor's graduates, n=125)					
Bac 2004	91.5	60.0	4.1	0.0	20.5
Q1, belong to the 25% lowest-performing students in the assessments in the first year of *collège* (Fr & Maths)	100.0	40.0	2.5	0.0	17.1
Technology/vocational bac	20.2	45.6	14.1	0.0	8.9
Licence Professionnelle	14.9	43.2	18.1	0.0	6.7
Other situation OS	100.0	4.8	0.3	0.0	5.4
Q2, belong to the 50% (q2) lowest-performing students in the assessments in the first year of *collège* (Fr & Maths)	14.1	27.2	12.0	0.0	4.8
Bac 2005	29.4	4.0	0.8	0.0	2.9
Bac with a pass grade	7.9	59.2	46.7	0.0	2.9
No occasional work	7.7	53.6	43.3	0.0	2.4
Class 2 – "Second chance" pathways (21% of bachelor's graduates, n = 422)					
Licence Professionnelle	68.9	59.2	18.1	0.0	22.6
Technology/vocational bac	70.6	47.2	14.1	0.0	19.8
Bac 2003	48.5	53.3	23.2	0.0	15.5
Regular work +15h/wk	30.3	84.1	58.5	0.0	12.6
No occasional work	33.0	67.8	43.3	0.0	11.4
No regular work -15h/wk	26.3	91.7	73.5	0.0	10.4
Q2, belong to the 50% lowest-performing students in the assessments in the first year of *collège* (Fr & maths)	46.5	26.5	12.0	0.0	9.5
Q3, belong to the 50% (q3) highest-performing students in the assessments in the first year of *collège* (Fr & maths)	30.2	42.4	29.6	0.0	6.4
Bac retake	35.0	23.7	14.3	0.0	5.9
Bac 2005	64.7	2.6	0.8	0.0	3.8
One parent is a non-manual worker, the other a manual worker	29.2	18.0	13.0	0.0	3.3
Bachelor's in management and economics	31.8	6.4	4.2	0.0	2.4
One parent is in management, professional or an intermediate occupation, the other is a manual or non-manual worker	24.7	26.1	22.2	0.0	2.1
The father is a non-manual or manual worker, the mother is not working	36.7	2.6	1.5	0.0	2.0
Class 3 – "*Héritières*" (8.3% of bachelor's graduates, n = 166)					
Bac with a "good"/"very good" grade	66.5	83.7	10.4	0.0	24.4
Bachelor's in other programmes via a CPGE	100.0	27.1	2.2	0.0	15.2
No regular work +15h/wk	14.7	73.5	41.5	0.0	8.7
Q3, belong to the 50% highest-performing students in the assessments in the first year of *collège* (Fr & maths)	12.3	83.1	55.9	0.0	7.7
Bac 2002	10.9	94.6	71.9	0.0	7.7
One parent is in management (the other is not working or is self-employed) or one parent is self-employed (the other is not working or is self-employed).	16.7	27.7	13.7	0.0	5.0
General bac	9.2	95.8	85.9	0.0	4.3
Both parents are in management or intermediate occupations	12.0	42.8	29.5	0.0	3.8
Bachelor's in fundamental sciences	15.3	14.5	7.8	0.0	3.0

➔

	Class/ Category (% in row)	Category/ Class (% in column)	All bachelor's graduates	p. value	v. test
Class 4 – "Respectable pathways" (33.2% of bachelor's graduates, n = 666)					
Bac 2002	43.7	94.4	71.9	0.0	17.3
Bac with a "fairly good" grade	58.3	50.2	28.6	0.0	14.8
General bac	38.4	99.1	85.9	0.0	14.0
Q4, belong to the 25% highest-performing students in the assessments in the first year of *collège* (Fr & maths)	45.5	76.4	55.9	0.0	13.3
No regular work -15h/wk	40.4	89.2	73.5	0.0	11.8
IUP bachelor's	72.6	14.7	6.7	0.0	9.7
Bachelor's in languages	58.3	15.3	8.7	0.0	7.1
Bachelor's in law	53.6	17.7	11.0	0.0	6.6
SVTU bachelor's	60.5	11.7	6.4	0.0	6.5
Bachelor's in fundamental sciences	54.8	12.9	7.8	0.0	5.8
No occasional work	39.7	51.7	43.3	0.0	5.3
Both parents are in management, professional or intermediate occupations	42.0	37.2	29.5	0.0	5.3
Both parents are manual workers	56.4	6.6	3.9	0.0	4.3
No regular work +15h/w	37.0	46.1	41.5	0.0	3.0
Class 5 – "Middle of the road" (31.1% of bachelor's graduates, n = 623)					
Regular work -15h/wk	67.9	57.8	26.5	0.0	20.9
Occasional work	46.3	84.4	56.7	0.0	17.5
General bac	35.5	97.9	85.9	0.0	11.8
SHS bachelor's	58.3	32.7	17.5	0.0	11.6
Bac with a pass grade	42.5	63.7	46.7	0.0	10.3
Bachelor's AES STAPS	66.9	18.1	8.4	0.0	10.0
Bachelor's in humanities	59.0	13.6	7.2	0.0	7.2
One parent is in management (the other is not working or is self-employed) or one parent is self-employed (the other is not working or is self-employed).	42.2	18.6	13.7	0.0	4.2
Q4, belong to the 50% lowest-performing students in the assessments in the first year of *collège* (Fr & maths)	36.8	35.0	29.6	0.0	3.5
Bac 2003	37.3	27.8	23.2	0.0	3.2
No regular work +15h/w	34.5	45.9	41.5	0.0	2.7
Bachelor's in management and economics	44.7	6.1	4.2	0.0	2.7
Bac retake	37.8	17.3	14.3	0.0	2.6
Both parents are non-manual workers	40.9	7.2	5.5	0.0	2.2

Note: For each class, only significantly over-represented categories are presented.
Interpretation: 91.5% of baccalaureate holders in 2004 are in class 1. Baccalaureate holders in 2004 account for 60% of students in class 1. Holders of a baccalaureate obtained in 2004 account for 4.1% of all bachelor's graduates. This category is significantly (p value 0.0) and positively (v test 20.5) associated with class 1.
Scope: Baccalaureate holders with a bachelor's. Individuals whose grade in the baccalaureate and results in the assessments in the first year of *collège* along with individuals whose social background (father and mother) were unknown were excluded from the analysis.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

APPENDIX 4

INDIVIDUAL AND ACADEMIC CHARACTERISTICS PER CLASS OF TRAJECTORY TO OBTAINING A BACHELOR'S

(% in column)

	Class 1 "poor or difficult secondary backgrounds"	Class 2 "second-chance students"	Class 3 "female inheritors"	Class 4 "respectable educational backgrounds"	Class 5 "middle-of-the-road educational backgrounds"
Women	48	42	63	64	68
Men	52	58	37	36	32
Both parents are management, professional or intermediate occupations	18	22	42	38	26
One parent in management (the other is not working or self-employed) or one parent self-employed (the other not working or is self-employed)	12	14	29	6	18
One parent in management, professional or an intermediate occupation, the other a manual or non-manual worker	20	25	15	20	24
One parent self-employed, the other a non-manual or manual worker	7	6	2	6	6
All employed working classes	43	34	12	30	25
- in which both parents are non-manual workers	5	6	2	4	7
- in which one parent is a non-manual worker, the other a manual worker	11	18	1	12	14
- of which both parents are manual workers	11	2	3	6	1
- in which the father is a non-manual or manual worker, the mother is not working	6	5	5	5	3
- in which the mother is a non-manual or manual worker, the father is not working	2	3	1	2	0
- in which neither parent is working	7	0	0	0	0
Father has a higher education qualification	12	19	46	32	27
Father has a baccalaureate	11	14	11	15	16
Father has a CAP, BEP	32	38	23	29	35
Father has no qualification or qualification unknown	45	29	19	24	23
Mother has a higher education qualification	20	22	46	33	28
Mother has a baccalaureate	12	19	19	20	20
Mother has a CAP, BEP	30	38	17	28	33
Mother has no qualification or qualification unknown	38	22	19	20	20
At least one parent not of French origin	32	25	24	19	21
Both parents are of French origin	68	75	76	81	79
Science bac (Bac S)	21	23	41	49	36
Economic and social studies bac (Bac ES)	16	25	27	29	36
Literature bac (Bac L)	14	4	27	21	27
Technology bac (Bac Technologique)	41	46	5	1	2
Vocational bac (Bac Professionnel) (or equivalent bac)	9	2	1	0	0

Note: The percentages given in italics are based on low participant numbers.
Interpretation: Women account for 48% of students in class 1, entitled "Poor or difficult secondary education backgrounds".
Scope: Baccalaureate holders with a bachelor's. Individuals whose grade in the baccalaureate and results in the assessments in the first year of *collège* along with individuals whose social background (father and mother) were unknown were excluded from the analysis.
Sources: MEN-DEPP, panel of pupils who entered the first year of *collège* in 1995 and were followed up in higher education.

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