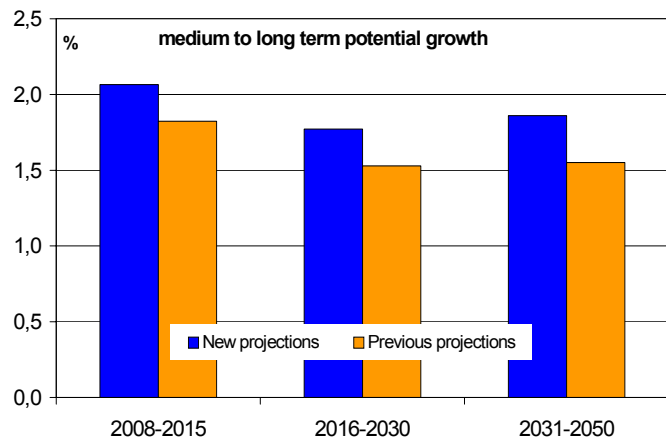




## Estimates of French medium to long-term potential growth revisited

- INSEE recently published new projections of the French working population to 2050. According to these estimates, the number of people in the labour force would continue to rise till 2015 then stabilise at between 28.2 and 28.5 million, whereas in earlier calculations, the labour force was projected to decline as from 2007. This dynamism stems from increased fertility, more abundant immigration, and higher activity rates, in the 60-64 age group notably, as a result of the pension reform.
- These new projections have led to an upward revision of the labour force growth rate and hence the economy's growth potential. The latter has been revised upward by more than a quarter of a percentage point relative to the previous estimate. Adopting conservative assumptions regarding capital accumulation and assuming unchanged legislations, potential growth would work out to 2.1% per year for the medium term (2008-2015), 1.8% per year over the period 2015-2030, and 1.9% over the very long term (2030-2050).
- These revised projections – of population, working population and growth potential – have three consequences: first, the total population looking to 2050 would be relatively younger than previously thought, since the proportion of under 15s in the total population would be in the region of 17% (very close to the current figure of 19%); the ratio of working to non-working people aged over 60 is set to decline, but slightly less than previously expected (from 2.2 now to 1.4 by 2050); per capita wealth is set to rise relative to previous projections as from 2025, when the additional fertility would boost the size of the working population.

This study was prepared under the authority of the Treasury and Economic Policy General Directorate and does not necessarily reflect the position of the Ministry of the Economy, Finance and Industry.



## 1. The new working population scenario points to faster growth

Potential growth is the growth of supply resulting from the combination of production factors: capital, labour and technical progress. Potential growth projections are based on specific assumptions reflecting observed past trends; hence they should not be seen as forecast. A detailed presentation of potential growth definition can be found in DPAE n° 48<sup>1</sup>.

Potential growth projections are based on future trends of production factors, in particular labour force. According to ILO (International Labour Organisation), the labour force includes everybody aged above 15 who either worked or actively looked for a job during a reference week. INSEE, the official French statistics bureau, recently published new projections of the size of the labour force<sup>2</sup>. These projections point to faster growth than the previous projections established in 2002 (see table 1) presented in DPAE n°48.

According to the new projections, as from 2007, the labour force will grow more slowly than in the past until 2015, at which point it will number 28.3 million individuals. It will then stabilise at between 28.2 and 28.5 million. Under the previous projection, the labour force was expected to grow until 2007, reaching 27 million, declining thereafter, to 24.4 million in 2050. Looking to 2050, the new projections now forecast a labour force over 4 million greater than previously thought.

Leaving aside some marginal modifications in the method used to project activity rates, three main factors help to explain the upward revision in projections of the size of the labour force:

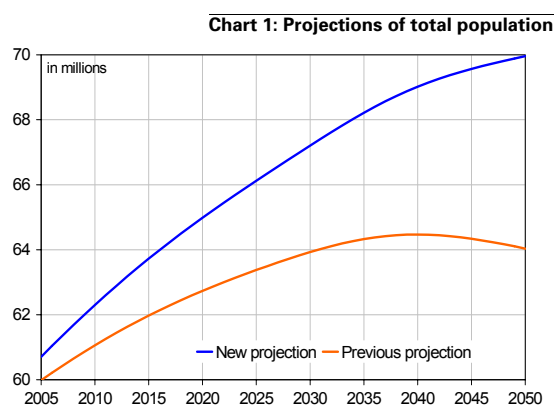
- a more favourable population growth scenario,
- the inclusion of the effects of the pension reform enacted in 2003 and the upward revision of the impact of the 1993 pension reform,
- an upward revision of activity rates consistent with the results of the new Jobs Survey by INSEE.

### 1.1 Recent demographic information have led to an upward revision of the actual total population

These labour force projections are based on new projections of the total population, according to which the total population of metropolitan France is set to grow continuously until 2050, albeit at a steadily slowing rate, rising to 70 million in 2050. Earlier projections expected the total population to cease growing some time around 2040, declining thereafter to 64 million inhabitants in 2050, i.e. roughly 6 million fewer than under the new projections (chart 1).

The reason for this is that INSEE has taken the new demographic information to revise some of the assumptions used in its projections to 2050, thus increasing the projected total population:

- the fertility rate now works out to 1.9 children per woman until 2050 (instead of the 1.8 children assumed in the 2002 projections). The cyclical indicator of fertility has indeed held steady at nearly 1.9 children per woman since 2000.
- net migration, which averaged around 50,000 per year in the period 1980-2000, was close to 100,000 in 2002, 2003 and 2004, which suggests the need to take this level (+100,000 / year) in population projections.



Source : INSEE.

**Table 1: labour force projections to 2050, millions people (source INSEE)**

	2000	2005	2010	2020	2030	2040	2050
New projection	26.701	27.638	28.169	28.204	28.189	28.420	28.531
Previous projection	26.272	26.940	26.922	26.335	25.569	25.030	24.365
deviation in %	1.6	2.6	4.6	7.1	10.2	13.5	17.1

(1) E. Bretin (2004): «La croissance potentielle de l'économie française de moyen-long terme», DPAE n° 48. Available in French only.

(2) I. Robert-Bobée (2006): «Projections de population pour la France métropolitaine à l'horizon 2050 – La population continue de croître et le vieillissement se poursuit» (Population projections for metropolitan France to 2050 – the population will continue to grow and continue to age), *Insee Première 1089*.

Conversely, slightly less favourable assumptions of life expectancy at birth<sup>3</sup> point to slower population growth in the years to 2050. Life expectancy in the years to 2050 has been revised downward, to 83.8 for men and 89.0 for women, compared with 84.3 for men and 91.0 for women in the previous projections. This change in the age structure of the population implies a reduced dependency ratio by comparison with the earlier projections.

## 1.2 Activity rates have been revised upwards in the light of the 1993 and 2003 pension reforms and the new Jobs Survey

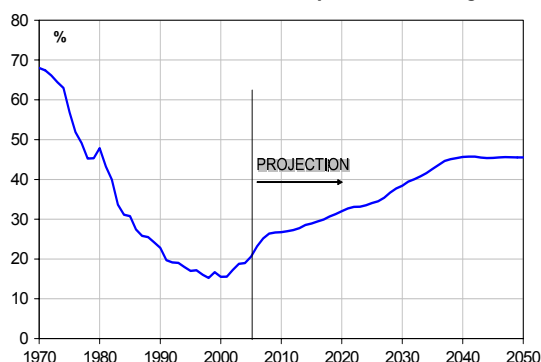
### The 1993 and 2003 pension reforms

INSEE's 2002 projections obviously did not take into account the 2003 pension reform: by lengthening the duration of contributions and modifying the methods of calculating pensions, the reform is expected to raise the average age at which people cease work and thus lead to a significant increase in the labour force. Moreover, recent information revalues activity rates upwards. Finally, the lengthening of the amount of time spent studying could also lead to a rise in the average retirement age.

Behaviour with respect to the age of retirement has been modelled using the Destinie model<sup>4</sup>, in which individuals are supposed to be very sensitive to retirement conditions. These simulations lead to the assumption of a steep rise in activity rates for the 60 to 64 age-group in the reference scenario, with a 25 percentage-point increase for men and 20 points for women to 2050. As a result, the activity rate for women aged 60-64 would rise from 16.6% in 2005 to 34.7% in 2050; the corresponding rate for men in the same age group would rise from 18.5% in 2005 to 45.5% in 2050, thus reverting to its level at the beginning of the 1980s (chart 2).

In addition, INSEE published activity rates for the 60-64 age-group based on a smaller sensitivity to retirement conditions. The impact on potential growth is presented in part 3.2.

Chart 2: Activity rates for men aged 60-64



Source : INSEE.

### The new Jobs Survey

The Jobs Survey used in making projections has undergone substantial methodological changes since 2002. The previous Jobs Survey (pre-2002) used to be conducted solely in March (whereas the current Jobs Survey is conducted continuously, year-round and shows pronounced swings in the size of the labour force). Activity rates are usually lower in March, which explains why the previous Survey underestimated the labour force.

Comparison between the previous and the new Surveys shows a gap of around 450,000 active people, which helps account for the difference in level between the previous and new projections of the labour force (table 1).

## 2. The rise in the labour force would add 0.3 percentage point to annual growth potential

### 2.1 1 The assumptions adopted in the reference scenario...

To evaluate medium to long-term growth for the French economy, we need to define scenarios for change in the three determinants of growth<sup>5</sup>, namely labour supply, stock of capital, and total factor productivity (TFP).

The labour supply trend used in the reference scenario is assumed to be identical to the trend for the labour force

(the reference scenario used in INSEE's new projections). These projections do not include possible upcoming improvements in structural unemployment beyond 2008.

Trend growth in the stock of capital is deduced from the labour supply trend with the aid of assumptions regarding capital accumulation. In the reference scenario for growth potential, we have assumed an annual rate of growth in the capital coefficient<sup>6</sup> of 0.2% between 2008

(3) The new projections of total population reflect the narrowing, observable since the 1990s, of the gap in life expectancy at birth between the sexes. The earlier projections assumed a weaker narrowing of this gap. These assumptions are based on the 2005 demographic survey (derived from civil register death data) and have been validated by a panel of national and international experts.

(4) The Destinie model (modèle Démographique, Economique et Social des Trajectoires INDIVIDUELLES simulées - demographic, economic and social model of simulated individual trajectories) is a micro-simulation model that serves to project a representative sample of the French population. It has been developed since the early-1990s in order to simulate the impact of pension system reforms.

(5) See appendix for a brief presentation of the model used.

(6) The capital coefficient is defined as the ratio of the stock of capital to output.

and 2015 (prolonging the trend observed since 1995). From 2016 onwards, we assume that an equilibrium growth regime has been achieved and that capital is growing at the same pace as output. This is a conservative assumption corresponding to the bottom of the range presented at the time of the previous exercise (in DPAE no. 48). This is because, over the long period, the relative cost of investment has been observed to trend downwards relative to the cost of added value. If this fall in the relative cost of investment were to endure, we would see a rise in the capital coefficient.

Finally, the growth rate of total factor productivity (TFP) is assumed to be equal to average productivity gains over the past five years (1.2% per year). As Table 1 shows, the TFP growth rate has dipped sharply since 1965, but less and less rapidly as the French economy has moved closer to the technological frontier<sup>7</sup>. We therefore assume that this convergence has been achieved since the beginning of the 2000s. Moreover, we also propose an alternative scenario in which the slowdown in TFP continues till 2010, when the TFP growth rate would stabilise at 1%. The assumption of a 1.2% annual increase in TFP is consistent with those found in the literature<sup>8</sup>.

**Table 2: total factor productivity (TFP) growth since 1965**

In %	1965-1975	1975-1985	1985-1995	1995-2000	2000-2005
TFP growth rate	3.0	1.9	1.5	1.3	1.2

**Table 3: comparison of new and previous growth potential projections (broken down by the contributions of factors of production)**

		2008-2015	2016-2030	2031-2050
<b>New projections</b>	<b>Potential growth</b>	<b>2.1</b>	<b>1.8</b>	<b>1.9</b>
	Contribution of factors			
	- Labour	0.1	0.0	0.0
	- Capital (among which coefficient of capital)	0.8 0.1	0.6 0.0	0.6 0.0
	- TFP	1.2	1.2	1.2
<b>Previous projections</b>	<b>Potential growth</b>	<b>1.8</b>	<b>1.5</b>	<b>1.6</b>
	Contribution of factors			
	- Labour	-0.1	-0.2	-0.2
	- Capital (among which coefficient of capital)	0.7 0.1	0.5 0.0	0.5 0.0
	- TFP	1.2	1.2	1.2

*Interpreting the table: average annual growth is estimated at 2.1% between 2008 and 2015, with 0.1 percentage point of the growth attributable to the increase in labour supply, 0.8 percentage point to capital accumulation, and 1.2 percentage point to technological progress. Between 2008 and 2015, growth is partly due to the specific dynamics of capital (measured by the stock of capital), which contributes for 0.1% to GDP growth. Technical progress has a mechanical impact of 1.2% on growth, but it also triggers some capital accumulation: therefore, between 2008 and 2015, the total contribution of TFP would be 1.9% (0.2+(0.8-0.1)).*

**Table 4: breakdown of differential between projections**

	2008-2015	2016-2030	2031-2050
New projection	2.1	1.8	1.9
Previous projection	1.8	1.5	1.6
differential	+0.3	+0.3	+0.3
- direct contribution of labour	+0.2	+0.2	+0.2
- direct contribution of capital	+0.1	+0.1	+0.1

*Interpreting the table: the differential in estimated growth rates between the new and previous projections is 0.3 percentage point between 2008 and 2015, with 0.2 percentage point attributable to the growth in labour supply (direct effect), and 0.1 percentage point to capital accumulation (capital deepening: indirect effect).*

- (7) The «technological frontier» may be defined as all of the most efficient existing technologies (combinations of factors of production). The technological frontier evolves as a result of investment in R&D in advanced countries.
- (8) See Cette, Garcia, Villette (2006): «La croissance potentielle de l'économie française à l'horizon 2050» (French economic growth potential to 2050), *Economie Appliquée* (n°2), Tome LIX, p.165-178, which presents a projection based on a 1.4% TFP growth rate, or Carone et al. (2006): «Long-term labour productivity and GDP projections for the EU25 Member States: a production function framework», *European Commission, Economic Paper*, No. 253.

## **2.2 ...point to the conclusion that the potential growth rate would be 2.1% between 2008 and 2015, 1.8% between 2016 and 2030, and 1.9% thereafter**

Under the new projections, the potential growth rate is around 0.3 percentage point higher per year on average, regardless of the period considered (2008-2015, 2016-2030 or 2031-2050). As summarised in table 3, the average annual potential growth rate is evaluated at 2.1% between 2008 and 2015 (versus 1.7% in the previous projection) and at around 1.8% thereafter (versus 1.5% in the previous projection).

INSEE's upward revision of labour force projections contributes both directly and indirectly to the increase in growth potential:

- on the one hand the increase in labour supply automatically boosts output, inasmuch as it is a factor of production in the production function (direct effect).
- on the other, this sustained growth will lead to additional investment, thereby swelling the stock of capital (indirect effect). This mechanism flows directly from the balanced growth assumption, which is implicitly bound up with the concept of long-term growth potential. It is consistent with the assumption of zero long-

### **3. Alternative scenarios**

The projections do not include any change in the legislation. In particular, economic policy measures aimed at raising activity rates or productivity growth would thus have an impact on potential growth.

#### **3.1 The impact of demographic assumptions on medium to long-term growth**

The publication of total population and labour force projections was accompanied by the publication of several demographic variants. The working assumptions these are based on should not necessarily be seen as «realistic» but rather as serving to understand how a progressive change in behaviour would affect population size<sup>9</sup>. With the aid of these variants, we can assess the impact on growth potential of an increase in fertility, in net migration, and in labour force participation by women, young people and older workers (table5).

- An additional immigration of 50,000 people per year (bringing net migration from 100,000 a year to 150,000 a year, for example) would give an annual

term growth in the capital coefficient. The contribution of capital to growth is thus strictly positive and is additional to the direct contribution of labour.

We can quantify these two effects by breaking down the projected growth according to the contributions of the factors of production (tables 3 and 4).

In the previous growth projections, the shrinking labour force weighed negatively on growth from 2016 onwards, contributing -0.2 percentage point to growth. INSEE's upward revision in its labour force projections neutralises the contribution of labour to medium to long-term growth: this would imply an upward revision in growth potential of the order of 0.2 percentage point after 2016 owing to the direct effect of increased labour supply on growth.

For a given change in the capital coefficient, the upward revision in the labour force brings a concomitant revision in the stock of capital: on this view, the contribution of capital to growth would increase by an annual average of 0.1 percentage point over the whole of the period considered (indirect effect).

Altogether, the new labour force projections entail an increase in the economy's potential growth rate of the order of 0.3 percentage point per year.

0.1 percentage point boost to potential growth over the whole of the period considered.

- A 0.1 percentage point increment in the fertility rate above the one contained in the reference scenario (for example, from 1.9 children per woman to 2.0 children per woman) would boost the potential growth rate by 0.1 percentage point per year from 2030 onwards.
- A 10 percentage-point rise of in the Older workers' activity rates in 2050 (raising the activity rate for the 55-59 age group from 70% to 80%, compared with around 66% at present) would not significantly boost potential growth.
- A rise in the activity rate for young people (15-24) bringing this into line with rates observed in the EU15, would not boost growth potential significantly.
- Similarly, a 5 percentage-point rise in the activity rate for women aged 25-44 and 55-59 in 2050<sup>10</sup> would have no significant impact on potential growth.

(9) All changes begin to produce their effects in 2006 and reach their target values in 2050.

(10) This increase is the same as the increase in the activity rate for women aged 45-54 as projected in the reference scenario.

**Table 5: potential growth under different demographic assumptions**

	2008-2015	2016-2030	2031-2050
Baseline	2.1	1.8	1.9
Net migration of 150,000 per year	2.2	1.9	2.0
Fertility rate 2.1	2.1	1.8	2.1
Increase in women's activity rates	2.1	1.8	1.9
Increase in young people's (15-24) activity rates	2.1	1.8	1.9
Increase in older workers' activity rates	2.1	1.8	1.9

Interpreting the table: the French economy's potential growth rate works out to 1.8% per year between 2016 and 2030 in the reference scenario, and 1.9% if net migration was 150,000 per year instead of 100,000...

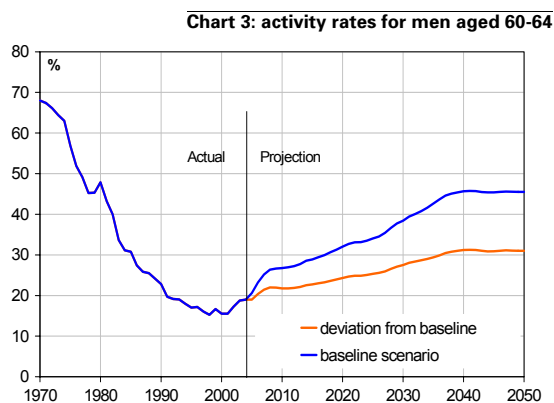
**Table 6: potential growth under different economic assumptions**

	2008-2015	2016-2030	2031-2050
Baseline	2.1	1.8	1.9
Effects of pension reforms halved	2.0	1.7	1.8
Increase in capital coefficient	2.3	2.0	2.1
Weak TFP growth, only 1% p.a.	1.8	1.6	1.6

Interpreting the table: the French economy's growth potential works out to 1.8% per year between 2016 and 2030 in the reference scenario, but to 1.7% if the impact of the pension reforms on activity rates for the 60-64 age group is half that expected.

The reference scenario is the INSEE (2006) «trend» scenario for labour force projections, with total factor productivity growing by 1.2% per year, the capital coefficient rising by 0.2% per year until 2015 and by 0% thereafter until 2050, and the structural unemployment rate close to the level reached in 2008.

### 3.2 The impact of economic assumptions on medium to long-term growth



Source: INSEE.

INSEE has also published a major alternative scenario that concerns the extent of the effects of the pension reform on activity rates for the 60-64 age group. INSEE proposes a scenario in which the effect of the pension reform on activity rates for the 60-64 age group is divided by 2. This would produce a fall in growth potential of only 0.1 percentage point per year over the whole of the period considered. The activity rate for men aged 60-64 would be around 15 percentage points less in 2050 than in the reference

scenario (chart 3). In this variant, the activity rate for men aged 60-64 in 2050 would be the same as in 1985 (31%), whereas the activity rate for men in the same age group in the reference scenario is close to its 1980 level (48%).

Moreover, for a given labour force, growth potential projections are derived from economic assumptions regarding changes in the capital coefficient and total factor productivity.

The reference scenario assumes, for example, an annual growth rate in the capital coefficient of 0.2% between 2008-2015 and nil thereafter. It therefore assumes, conservatively, that the economy rapidly reaches a steady state. Conversely, we could assume that the economy will still not have reached its steady state in 2050. That would be the (unlikely) case if the downward trend in the cost of investment in relation to the cost of added value were to persist. The variant considered, which is more optimistic than the reference scenario, assumes a 0.7% annual rate of growth in the capital coefficient between 2008 and 2015, then 0.5%<sup>11</sup> per year until 2050. This growth rate would raise the potential growth rate in the reference scenario by 0.2 percentage point over the period as a whole (table 6).

The reference scenario assumes the rate of growth in total factor productivity to be constant at 1.2%, i.e. the average figure since 2000. But recent years have seen a slowdown in the rate of growth of TFP. We may therefore consider a low-growth variant for TFP: if TFP grows at an annual rate of 1% (0.2 percentage point less than the reference scenario), then potential growth would decline automatically by 0.2 percentage point (table 6).

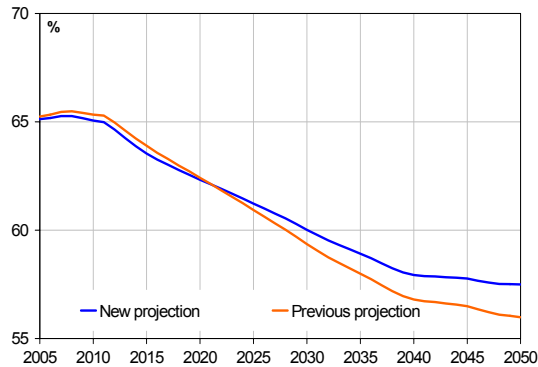
(11) Corresponding roughly to half the average rate observed since 1975.

#### 4. The new labour force projections point to a lessening of the burden of French population ageing compared with the 2002 projection

The ratio of active people to inactive people aged over 60 is currently around 2.2. This is projected to decline to 1.4 in 2050 according to the new projections. The previous projections were more pessimistic, estimating the ratio of active to inactive people aged over 60 at 1.1 in 2050.

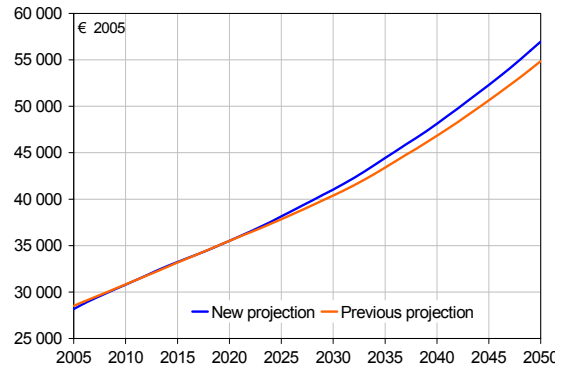
rate results in an even more pronounced increase in the projected per capita GDP. In 2050 the working age population will represent more than 57% of the total population, according to the new projections, compared with only 56% under the previous projections.

Chart 4: working age population as % of total population



Source : INSEE.

Chart 5: per capita GDP projections



Source : INSEE, calculated by DGTPE.

The revised projections of total population (by age group and gender) imply an upward revision of the ratio of working age population to total population from 2020 onwards (chart 4). This is explained by the fact that the population would be relatively younger, thus boosting per capita GDP relative to the previous projection, with no change in the activity rate. The estimated rise in the activity

The new and previous per capita GDP projections are presented in chart 5, which shows that the upward revision of the labour force would lead to a rise in per capita GDP as from 2025.

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## Appendix: methodology used

The calculation of long-term potential growth is based on the definition of a Cobb-Douglas-type production function:  $y = (1 - \alpha)(n + h) + \alpha k + a$  where the share of capital in value added  $\alpha$  is assumed to be constant and equal to its historical average (1/3) and  $y, n, h, k$  and  $a$  respectively represent the rates of growth of output, the number of workers, the number of hours worked per worker, of capital and total factor productivity (technological progress or Solow residuals).

The relative contributions of labour, capital and technological progress are thus defined respectively by:

$(1 - \alpha)(n + h), \alpha k$  and  $a$ .

Potential growth projections are based on 3 types of assumptions:

– regarding the total number of hours worked:

- working force projections (from INSEE)
- stability of the structural unemployment rate
- stability of the number of hours worked per worker: new projections of the working force may cause to revisit past evolutions of the number of hours worked per worker; however, we keep the assumption that the number of hours worked per worker are unchanged as from 2008.

– regarding the evolution of technical progress (growth assumed to be equal to average since 2000).

– regarding the evolution of the stock of capital, coming from:

- the evolution of the coefficient of capital (capital per production unit) which slightly grows till 2015 so that the economy is back to its steady state growth path. Thereafter, the coefficient of capital is assumed to be steady.
- the evolution of production, then of the number of hours worked and of technical progress: given the coefficient of capital, the stock of capital grows at the same pace than production, so that the economy is on a steady state growth path.

In order to show the coefficient of capital  $k - y$ , the equation can be written:

$$y = (n + h) + \frac{1}{1 - \alpha}[\alpha(k - y) + a]$$

This presentation evidence the contributions of three engines of growth : hours worked ( $n + h$ ), the coefficient of capital, the the contribution from technical progress<sup>a</sup>. This breakdown is sometimes used in the litterature on potential growth.

a. note that the contribution from technical progress as a production factor and as an engine of production are different. The contribution of technical progress as a production factor represent the direct effect (or the mechanical effect) of total productivity growth on growth, whereas the contribution of technical progress as an engine of growth represents the total impact of TFP on growth (mechanical effect and effect on capital accumulation).

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