



Care and State Pension Reform:
The interaction of inflation indices
July 2018



The interaction of inflation indices

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- Pensions Policy Institute: John Adams, Chris Curry, Sarah Luheshi, Tim Pike
- Personal Social Services Research Unit, London School of Economics and Political Science: Raphael Wittenberg, Bo Hu, Derek King

Introduction

This paper discusses the interaction between the impact of the ‘triple lock’ on state pension income of older people and the user charges they may be required to contribute to the costs of their home care. It considers in particular the difference in home care charges between periods in which earnings rise faster than prices and periods in which prices rise faster than earnings and presents estimates of the probabilities of earnings exceeding prices or prices exceeding earnings.

To be eligible for local authority support for home care older people need to meet both the eligibility criteria in terms of need for care and the means test. For people whose needs for care meet the eligibility criteria and whose savings are below the current upper limit of £23,250, the amount they need to contribute in user charges depends on their assessed income. The means test takes account of almost all savings other than the value of the person’s home and almost all sources of income. Assessed income includes an assumed income from any savings between a lower limit of £14,250 and the upper limit of £23,250. They are generally required to contribute all their disposable income above a threshold, up to the full cost of their care. The threshold for a single person is currently £189.00 per week.

The triple lock provision for the annual uprating of state pensions provides that they rise in line with earnings, in line with prices (Consumer Prices Index, CPI) or by 2.5%, whichever is the highest of these three measures. While there has been discussion about reforming the triple lock, the government has decided to retain it during this parliament.

To illustrate the interaction between the pension uprating and user charges for home care, we analyse the effect of possible future movements in prices and earnings on the income and liability for care charges of an example older person. The income, wealth and care needs of this person were selected to illustrate how future movements in earnings and prices could affect the proportion of her after-tax income that care charges would absorb, and what level of income she would have left after meeting those care charges.

Key findings

- There is only a one in ten chance (10%) of this individual’s disposable income (after income tax and care costs) rising as fast as average earnings over a five year period.
- In nine out of ten scenarios (90%) the proportion of income spent upon care costs will increase.
- In close to half (45%) of scenarios State Pension income linked to the triple lock will increase in line with earnings over a five year period (i.e. that is, the period contains no years where the State Pension will rise by CPI or 2.5% due to the increase in earnings being below this level).
- Where an individual’s income is below the care threshold their income will most likely rise in line with CPI resulting in a wider range of outcomes in earnings terms.
- There is only a one in twenty-five chance (4%) that CPI will increase faster than earnings over a five year period.

Section one: the different inflation measures involved in assessing the care expenditure of an individual

To illustrate the effect of the interactions we present with a simple case study. It relates to a single older woman aged over 70 who has limited savings below the lower threshold for care charges, and whose income comprises a full basic State Pension of £125.95 per week and an occupational pension of £118.05 per week. She is assessed by her local authority as requiring a relatively low level of care in her own home, comprising a personal budget of £50 per week. Since her savings are low she is not required to make any contribution to the costs of her care from her savings. However, since her total income exceeds the threshold for home care charges by £55 per week, she is required to meet the full costs of her care.

We assume that the costs of home care, which is highly labour intensive, rise in line with average earnings in the economy. We also assume that her occupational pension rises in line with prices, that is, general inflation. We assume that the home care charging threshold rises in line with prices as while in recent years the threshold has not been uprated this situation is not expected to be maintained in the longer term. Prices in each case relate to the Consumer Prices Index (CPI).

The income on which care charges is assessed is net of income tax². We assume that the income tax personal allowance is linked to average earnings.

In periods in which prices rise faster than earnings (and by more than 2.5% per year) her income rises faster than the cost of her care. She therefore remains liable to meet the full costs of her care unless and until her needs increase such that she is assessed as requiring a larger personal budget. In periods in which earnings rise faster than prices (and by more than 2.5% per year) the person's income rises more slowly than the costs of her care such that in time she could cease to be liable to meet the full costs of her care. Finally, when prices and earnings each rise by less than 2.5% per year the person's income rises faster than the costs of her care and she remains liable to meet the full costs of her care.

Table 1: The different inflations at play in the case study

	Item	Index	Amount at stake	Application of inflation
Personal Income	Basic State Pension	Triple Lock	£125.90 per week	Triple lock is used to increase the amount of basic State Pension paid.
	Occupational Pension	CPI	£118.05 per week	Income from an occupational pension may be increased in line with other indexes, or not at all. Many Defined Benefit pension schemes increase payments by an

² Assessable income is also net of housing costs, such as rent and council tax, after taking account of any Housing Benefit and Council Tax Support. For simplicity we ignore this added complication while noting the potential for further interactions between differential movements in prices and earnings compared with movements in housing costs and benefits.

				inflationary measure (generally CPI) on an annual basis to prevent erosion of spending power.
	Personal Allowance for income tax	Average Earnings	£227.88 per week	Pension income above this allowance will be taxed at the marginal rate of income tax.
Care expenditure	Care cost	Average Earnings	£50.00 per week	The cost of home care is primarily driven by the labour cost. As wages increase the cost of the care provision rises accordingly.
	Care threshold	CPI	£189 per week	All income above this level is generally required to contribute to care costs.

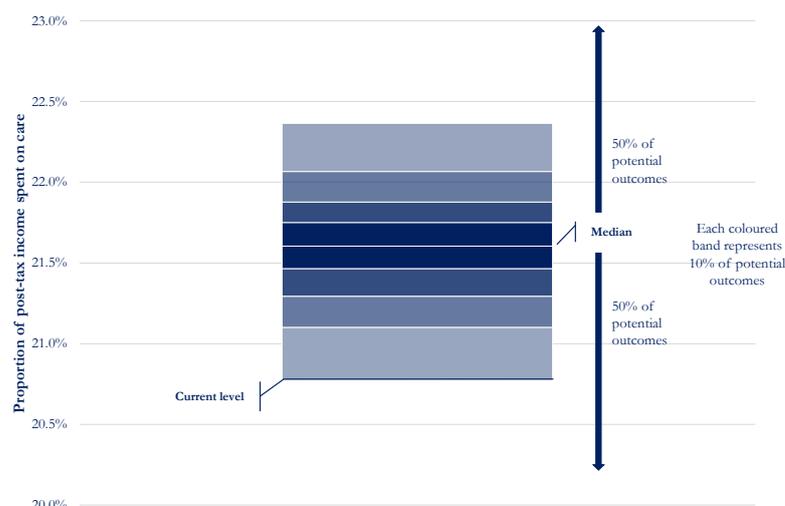
Section two: the impact of inflation scenarios upon an individual

Over the longer term earnings are expected to rise faster than price inflation on average. However there is a range of possible outcomes for each of the components of income as well as the contribution to care costs after five years of uncertain future inflation resulting in a varying amount of income being used to pay for care. A range of potential inflation scenarios has been simulated using the PPI's Economic Scenario Generator (ESG),³ and the impact upon personal income and care costs has been calculated.

The proportion of income used to pay for care

Currently in our case study our individual is contributing around 21% of her post-tax income (upon which contribution to care costs is assessed) towards her care costs. After five years of uncertain future there is a nine in ten chance (90%) that she will be contributing a higher proportion of her income towards care costs [Figure 1]. This is due to the cost of care tending to increase at a faster rate than her income (part of which is linked to CPI increases).

Figure 1: The range of potential outcomes for the proportion of pension income (after income tax) being spent upon care after five years



It is only in one in ten scenarios (10%) that her income rises at least as fast as earnings (and therefore care costs). This is due to the combination of inflation measures that are used to increase their pension income, such that within the five year period some components of income rise faster than earnings, though generally only for a couple of years.

- **Occupational pension income:** being linked to CPI this is unlikely to rise as fast as earnings, with only a 4% probability that CPI will increase faster than earnings over a five year period. However, over the course of five years there is a greater than one in three chance (36%) that in at least one year CPI will increase faster than earnings.

³ see Appendix one for further detail of the inflation outcomes

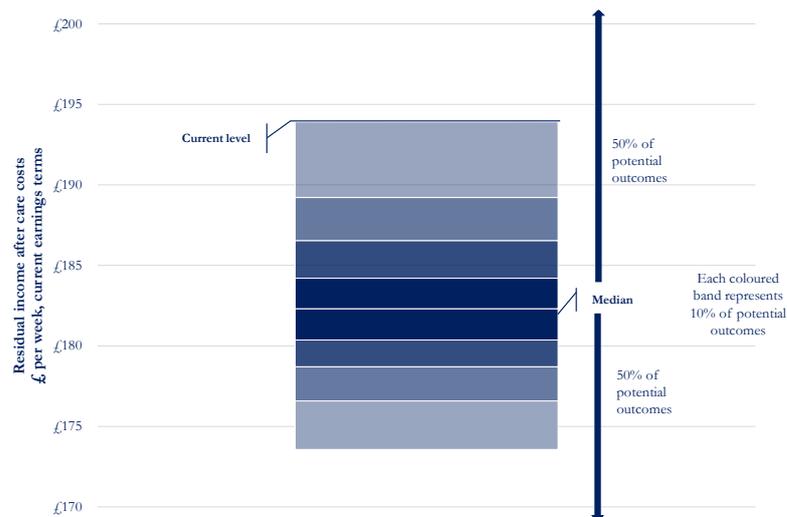
- **Basic State Pension income:** being increased by the triple lock, the basic State Pension must increase at least as fast as earnings, this being one of the three elements of the lock.
- In close to half (45%) of scenarios State Pension income linked to the triple lock will increase in line with earnings over the whole of the five year period (that is there are no years where the State Pension will rise by CPI or 2.5% due to the increase in earnings being below this level).

If their income grows slower than earnings a lower proportion of their income will be liable for income tax as the personal allowance grows at a faster rate than their income. This has the effect of narrowing the range of outcomes as income tax is a progressive tax.

Residual income after care costs

Income after care costs have been deducted, will influence the standard of living that is available. After five years of an uncertain future the spread of income levels for the ‘middle 50%’ of outcomes is around £8 per week in current earnings terms⁴ [Figure 2].

Figure 2: The range of potential outcomes of weekly income with care costs deducted after five years (current earnings terms)



Over time income levels are expected to be eroded in earnings terms due to inflationary pressures. This means that care costs are expected to rise at a faster rate than income, as occupational pension income is not expected to keep pace with earnings inflation. The care threshold of £189 per week protects a minimum income level which increases in line with CPI. Despite their income initially being only £2 per week above this (around 1%), their income is projected to increase in CPI terms over five years in all the stochastic scenarios and, as a result, the care threshold does not bite.

⁴ Results are expressed in current earnings terms to allow easy comparison with current income levels and potential living standards, adjusted for inflation.

The impact of alternative State Pension upratings and the care threshold

The basic State Pension is the only income component to generally keep pace with the inflationary pressure of care costs as a result of the current policy of triple lock indexation. However, legislation only mandates that this component of the State Pension should increase in line with earnings, and there is the possibility that a government may, in future, weaken the indexation to either a double lock (the higher of CPI and earnings increases) or to an earnings link in line with the legislated minimum.

In either of these scenarios income after care costs is more likely to be reduced in earnings terms and the burden of care is more likely to increase to a greater degree [Table 2].

Table 2. The impact of alternative State Pension upratings on the individual's care burden and weekly income with care deductions after five years.

Percentile of distribution	Basic State Pension uprating scenario								
	Triple lock			Double lock			Earnings link		
	% of income spent on care	Income after care costs £ pw, earnings terms	Income after care costs £ pw, CPI terms	% of income spent on care	Income after care costs £ pw, earnings terms	Income after care costs £ pw, CPI terms	% of income spent on care	Income after care costs £ pw, earnings terms	Income after care costs £ pw, CPI terms
1%	23.0%	167.82	192.20	23.0%	167.82	195.90	23.0%	167.82	192.85
5%	22.6%	171.23	194.04	22.6%	171.06	196.94	22.6%	171.06	194.43
10%	22.4%	173.57	195.69	22.4%	173.42	197.91	22.4%	173.42	196.01
25%	22.0%	177.68	198.88	22.0%	177.31	200.11	22.0%	177.28	199.31
50%	21.6%	181.43	202.92	21.6%	181.73	203.12	21.7%	181.60	202.82
75%	21.2%	185.75	206.91	21.3%	186.76	206.48	21.3%	186.16	206.43
90%	20.8%	190.71	210.27	20.9%	192.63	209.94	21.0%	190.83	209.93
95%	20.5%	193.87	212.49	20.6%	196.31	212.21	20.8%	193.25	212.21
99%	19.9%	200.95	215.72	20.1%	204.55	215.52	19.7%	200.12	215.52

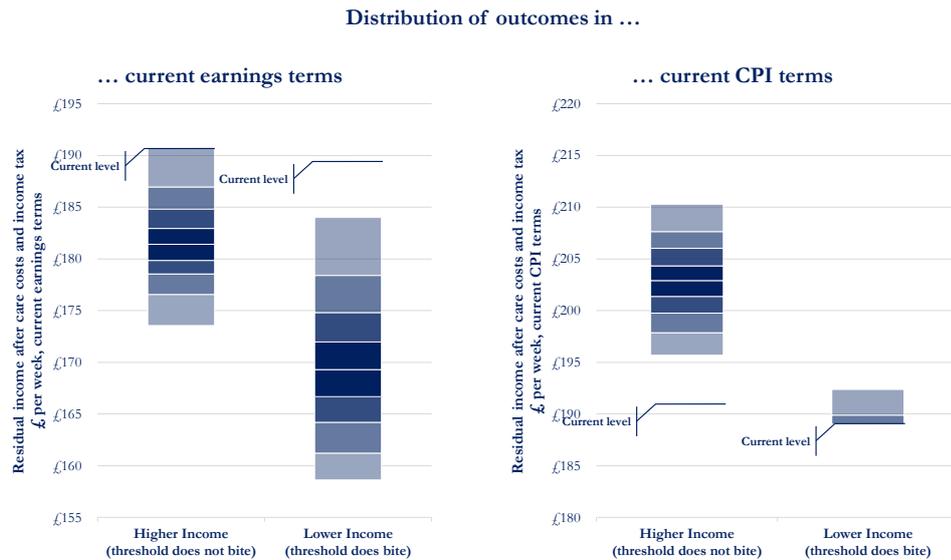
Under an earnings link the increase in care costs relative to income is such that there is now a 2.0% chance that the individual is no longer liable for the entirety of their care cost, as taking the full care cost from their income would leave their remaining income below the care threshold.

Someone on a lower income

An individual with a slightly lower occupational pension, say £100 per week, will in effect have their post-tax post-care income linked to the care threshold. They will receive support to their care costs and the proportion of their income that is spent on care is lower. They will only pay £37 per week (around 75%) of their care costs.

After five years they have around a one in four chance (25%) that their income will have risen sufficiently relative to the care threshold and the cost of care that they will need to meet the entirety of their care costs. However, for the most part their income is projected to increase in line with the level of the care threshold. Their income in earnings terms will become more eroded over the five year period because most cases any increase in income above CPI ends up diverted to care costs. [Figure 3].

Figure 3: The range of potential outcomes of weekly income with care costs deducted after five years (current earnings and CPI terms) for an income level currently above and below the care threshold



This has the effect that their income will rise in a manner closely aligned to CPI, whereas an individual with income above the income threshold for care charges (as in the original case study) will have their income rise in a manner driven by both earnings and CPI increases (State Pension income being increased in line with the triple lock which is dominated by the rate of increase in earnings, and occupational pension income increasing in line with CPI). An individual with a lower income is likely to see their income reduce by a greater amount in earnings terms and is unlikely to see their income increase in CPI terms. This will have implications for the individual's ability to maintain expenditure levels and patterns (and hence living standards).

When incomes rise faster than prices (CPI), living standards can generally be assumed to improve over time. However, if an individual's income merely follows CPI inflation they may not experience the improvements in living standards experienced by the wider population.

Appendix one: the interacting distributions of relative inflation measures

The analysis presented in the main body is based upon inflation projections derived using the PPI's economic scenario generator.⁵ This generates a number of equally possible future scenarios of CPI and earnings growth from which we can consider the distribution of their relative levels and infer triple lock and double lock values. The stochastic runs consist of 3,000 simulations.

The central long-term assumptions used in the modelling are from the OBR 2018 spring statement papers⁶ and are as follows:

- CPI inflation: 2.0% a year
- Earnings growth: 4.244% a year
- Triple lock and double lock are defined from projected CPI and earnings growth.

CPI outstripping Earnings

The median level of earnings growth is higher than the median level of CPI, however in some years CPI will be higher than earnings growth.

The results of the stochastic modelling can show how often and to what extent CPI is higher than earnings.

Within the five year time period, around 64% of scenarios had no instances of CPI being higher than earnings, 22% had one year out of five where CPI outstripped earnings, through to only 0.23% of runs having CPI higher than earnings for all of the five years [Table 3].

Table 3: Proportion of runs with instances of CPI being higher than earnings during a given period

Number of instances	Period of time (years)					
	2	3	5	10	15	20
0	80.77%	75.10%	63.97%	45.93%	33.20%	24.40%
1	15.23%	17.03%	21.87%	25.93%	24.93%	22.90%
2	4.00%	6.33%	8.77%	13.60%	17.40%	17.93%
3		1.53%	3.80%	7.87%	10.53%	12.97%
4			1.37%	3.80%	6.07%	8.37%
5			0.23%	1.60%	3.90%	5.37%
6				0.70%	2.13%	3.27%

⁵ See Appendix two: the PPI's Economic Scenario Generator

⁶ OBR (2018) Economic and Fiscal Outlook, and supporting documents <http://obr.uk/efo/economic-fiscal-outlook-march-2018/>

7				0.33%	0.87%	1.97%
8				0.17%	0.37%	1.30%
9				0.03%	0.37%	0.83%
10				0.03%	0.17%	0.27%
11					0.07%	0.27%
12					0.00%	0.13%
13					0.00%	0.00%
14					0.00%	0.00%
15					0.00%	0.03%

Table 3 shows the incidence of CPI exceeding earnings growth, but not the effect of the relative level of earnings and CPI. Table 4 shows the percentile points of distribution of earnings growth less CPI over a period of time. The results are presented as the annualised average increase in earnings, less the annualised average increase in CPI over a given period of time. A negative value indicates CPI being higher than earnings growth over the period.

Table 4. Distribution of earnings minus CPI over a period of time (annualised average difference)

Percentile of distribution	Period of time (years)					
	2	3	5	10	15	20
1%	-1.31%	-1.14%	-0.74%	-0.09%	0.15%	0.37%
5%	-0.38%	-0.20%	0.12%	0.61%	0.80%	0.92%
10%	0.20%	0.35%	0.55%	0.96%	1.15%	1.24%
25%	1.11%	1.27%	1.41%	1.60%	1.66%	1.71%
50%	2.29%	2.26%	2.28%	2.27%	2.25%	2.26%
75%	3.38%	3.28%	3.13%	2.97%	2.91%	2.84%
90%	4.41%	4.19%	3.95%	3.60%	3.45%	3.35%
95%	5.01%	4.74%	4.45%	4.03%	3.81%	3.67%
99%	6.11%	5.72%	5.18%	4.69%	4.39%	4.22%

- For example, over a 3 year period, in 5% of cases CPI growth exceeds Earnings growth by 0.2% or more a year.
- Long-term growth in earnings is assumed from the OBR to be around 2.24% higher than long-term CPI growth.
- The inter quartile-range reduces as the time horizon increases.

Triple lock and double lock compared with CPI

Tables 5 and 6 are similar to Table 4 in design, but instead of earnings growth less CPI they set out triple lock and double lock compared with CPI respectively.

Table 5. Distribution of triple lock minus CPI over a period of time (annualised average difference)

Percentile of distribution	Period of time (years)					
	2	3	5	10	15	20
1%	0.00%	0.02%	0.27%	0.70%	0.84%	1.03%
5%	0.28%	0.46%	0.68%	1.05%	1.28%	1.40%
10%	0.67%	0.80%	1.02%	1.35%	1.53%	1.59%
25%	1.39%	1.55%	1.67%	1.86%	1.92%	1.97%
50%	2.38%	2.39%	2.45%	2.44%	2.43%	2.44%
75%	3.42%	3.34%	3.22%	3.09%	3.00%	2.96%
90%	4.41%	4.22%	3.98%	3.67%	3.51%	3.41%
95%	5.02%	4.74%	4.47%	4.07%	3.86%	3.73%
99%	6.11%	5.72%	5.21%	4.77%	4.44%	4.26%

- The triple lock is defined as the maximum of 2.5%, CPI and earnings so it is never lower than CPI, therefore there are no occasions where the triple lock is less than CPI, hence there are no negative numbers in the table.
- A high value in the table represents triple lock being high over the period compared to CPI, so would suggest that State Pensions would be increasing compared to costs which are more closely aligned to the CPI.

Table 6. Distribution of double lock minus CPI over a period of time (annualised average difference)

Percentile of distribution	Period of time (years)					
	2	3	5	10	15	20
1%	0.00%	0.00%	0.18%	0.58%	0.72%	0.85%
5%	0.10%	0.33%	0.52%	0.91%	1.11%	1.22%

10%	0.45%	0.64%	0.84%	1.20%	1.36%	1.44%
25%	1.19%	1.36%	1.51%	1.72%	1.79%	1.83%
50%	2.29%	2.27%	2.33%	2.32%	2.32%	2.32%
75%	3.38%	3.28%	3.14%	3.00%	2.93%	2.88%
90%	4.41%	4.19%	3.95%	3.61%	3.46%	3.36%
95%	5.01%	4.74%	4.45%	4.04%	3.82%	3.69%
99%	6.11%	5.72%	5.18%	4.69%	4.39%	4.22%

- The double lock is defined as the maximum of CPI and earnings so it is also never lower than CPI, so again there are no negative numbers in the table.
- The double lock is considered to be a potential replacement for the triple lock, which would remove the 2.5% minimum, and as a result it is slightly lower than the triple lock. This is reflected in the results in Table 6 compared with Table 5.

Appendix two: the PPI's Economic Scenario Generator

The PPI's Economic Scenario Generator (ESG) is used to produce randomly generated future economic scenarios based upon historical returns and an assumption of the median long-term rates of return. It was developed by the financial mathematics department at King's College London. It is used to test how the distribution of outcomes is influenced by the uncertainty of future economic assumptions.

Key results

The model generates projected future inflation rates, and earnings growth

- Inflation rates
 - Future CPI increases and earnings inflation rates
- Investment returns
 - Returns are produced for the major asset classes of equity, cash and gilts

This produces nominal returns which can be combined to produce investment returns for a more complex portfolio.

Application of output

The output of the ESG is a number of economic scenarios which are employed by the PPI's other models to analyse the distribution of impacts on a stochastic economic basis.

Key data sources

The specification of the model is based upon historical information to determine a base volatility and future assumptions to determine a median future return:

- **Historical returns:** Historical yields and returns as well as inflation measures are used to determine the key attributes for the projected rates
- **Future returns:** Future returns are generally taken from the Office for Budget Responsibility (OBR) Economic and Fiscal Outlook (EFO) to ensure consistency with other assumptions used in the model for which the economic scenarios are being generated. Volatility can also be scaled against historical levels.

Summary of modelling approach

The six identified risk factors modelled are:

G	Nominal GDP
P	CPI
W	Average weekly earnings
Y ^l	Long-term yields
Y ^s	Money market yields
S	Stock returns

Using these variables, a six dimensional process, x_t is defined.

$$\begin{bmatrix} \ln G_t - \ln G_{t-12} \\ \ln(P_t - \ln P_{t-12} + 0.02) \\ \ln W_t - \ln W_{t-12} \\ \ln(e^{y_t^l} - 1) \\ \ln(e^{y_t^s} - 1) \\ \ln S_t \end{bmatrix}$$

Where t denotes time in months.

The development of the vector x_t is modelled by the first order stochastic difference equation:

$$\Delta x_t = Ax_{t-1} + a + \varepsilon_t$$

Where A is a 6 by 6 matrix, a is a six dimensional vector and ε_t are independent multivariate Gaussian random variables with zero mean. The matrix A and the covariance matrix of the ε_t were determined by calibrating against the historical data. The coefficients of a were then selected to match the long-term economic assumptions.

It follows that the values of x_t will have a multivariate normal distribution. Simulated investment returns will, however, be non-Gaussian partly because of the nonlinear transformations above. Moreover, the yields are nonlinearly related to bond investments.

The first component and third components of x_t give the annual growth rates of GDP and wages, respectively. The fourth and fifth components are transformed yields. The transformation applied ensures that the yields are always positive in simulations. Similarly the second component gives a transformed growth rate of CPI. In this case, the transformation applied ensures that inflation never drops below -2% in the simulations. This figure was selected to be twice the maximum rate of deflation ever found in the historical data.

Acknowledgements and Contact Details

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