Timor-Leste Petroleum Fund

From Oil to Financial Assets: Planning for A Sustainable Future for Timor-Leste

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May 2010

TOWERS WATSON

Agenda

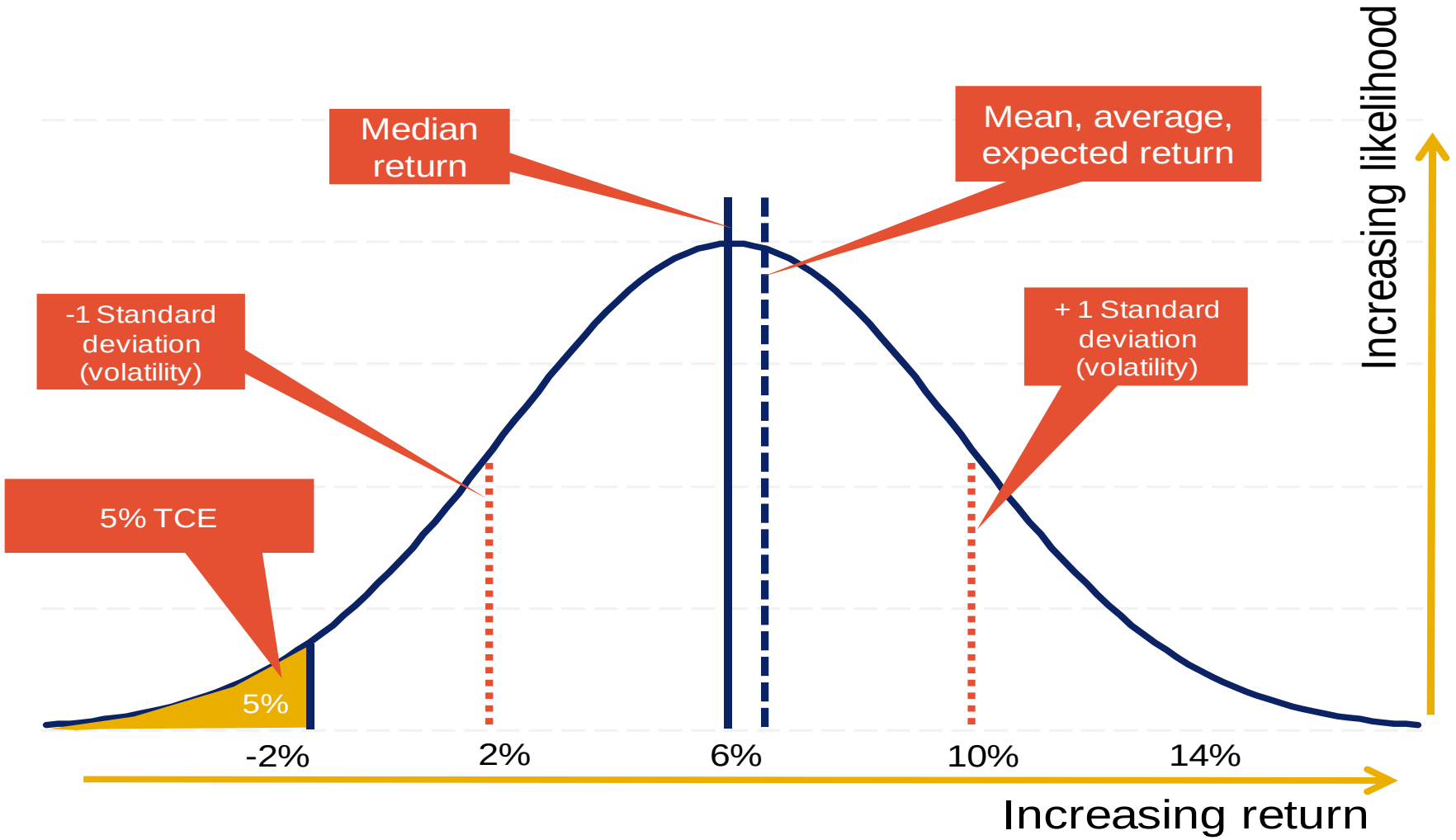
- The Investment world – some concepts
- Modelling Approach and Key Findings
- Current Fund Strategy
- Different investment strategies – forward-looking analysis
- Impacts

The Investment world – some concepts

Key investment terms

- **Equity**: a security representing partial ownership of a company, for example Microsoft shares on the New York Stock Exchange.
  - A portfolio of equities may consist of hundreds of equity stakes in different companies around the world.
- **Bond**: a bond is a loan to a government or company who promises to pay back the lenders some time in the future, for example a US Treasury Bond.
  - A portfolio of bonds may consist of bonds issued by different companies or governments and the time over which the money is repaid may vary from (say) 1 to 30 years.
- **Investment return**: the increase (or decrease) in the value of an investment, plus any income received over a given period. Often expressed as a percentage of the funds invested, for example a 5% return indicates $5 profit for each $100 invested.
- **Investment risk**: the uncertainty of the investment return, often measured as 'volatility', though there are many measures of investment risk. It is important to define investment risk in a way that is relevant to the investor's investment objectives.
- **Investment objectives**: what the investor wants to achieve from their investments – may be expressed as target level of return, but be subject to a risk tolerance.

The investment return distribution

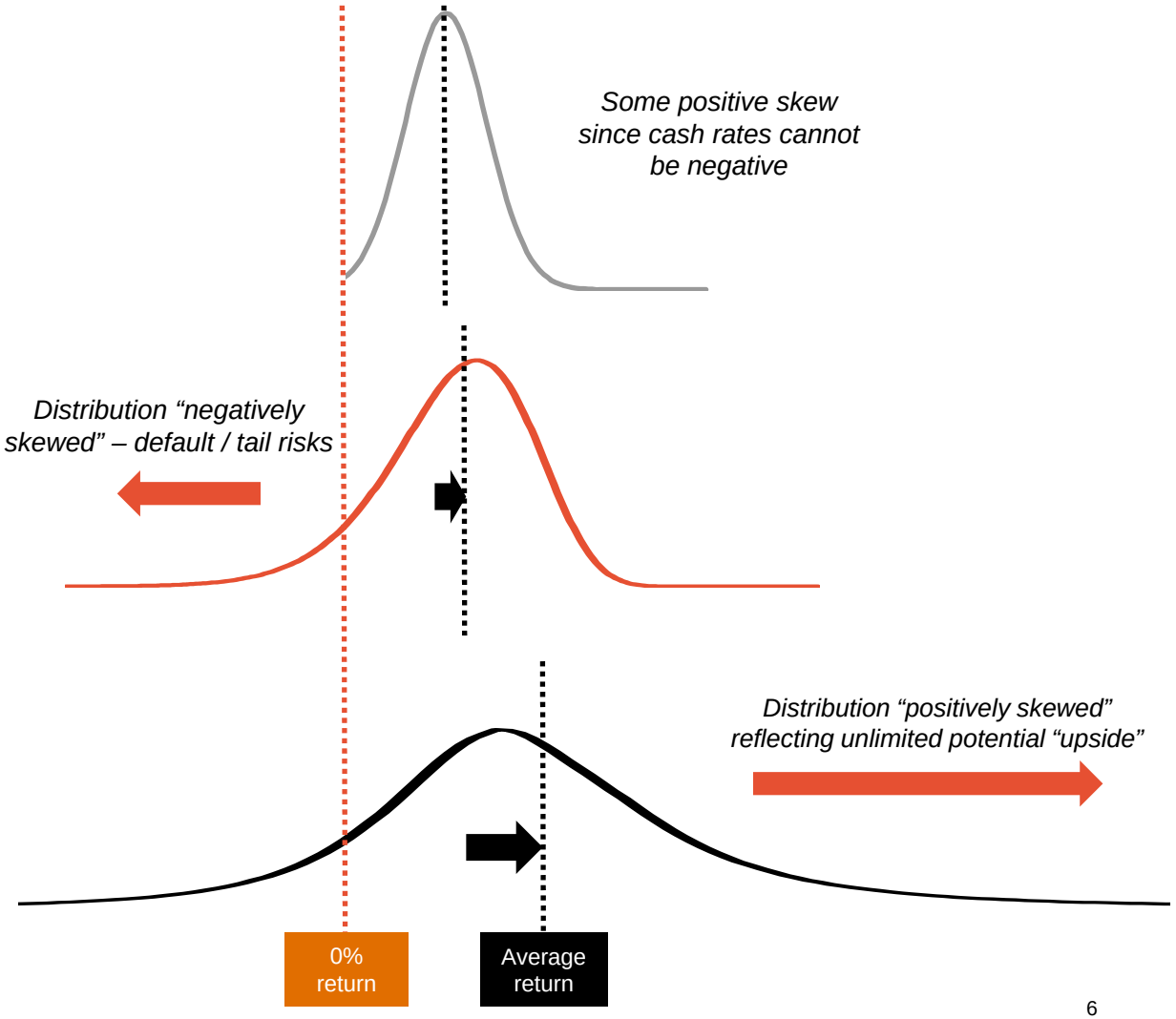


Return Profiles

Cash

Debt/Bonds/Loans

Equities

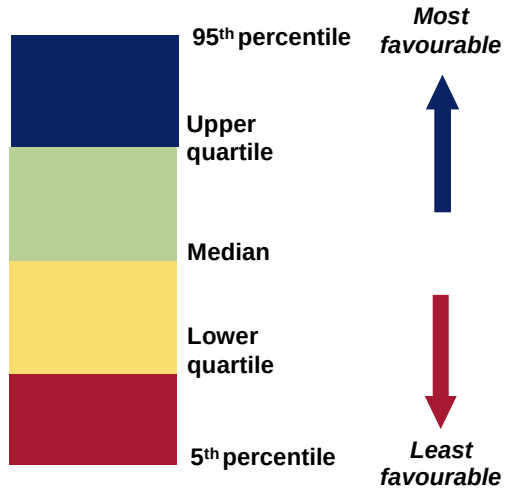


Key statistical terms – the investment return distribution

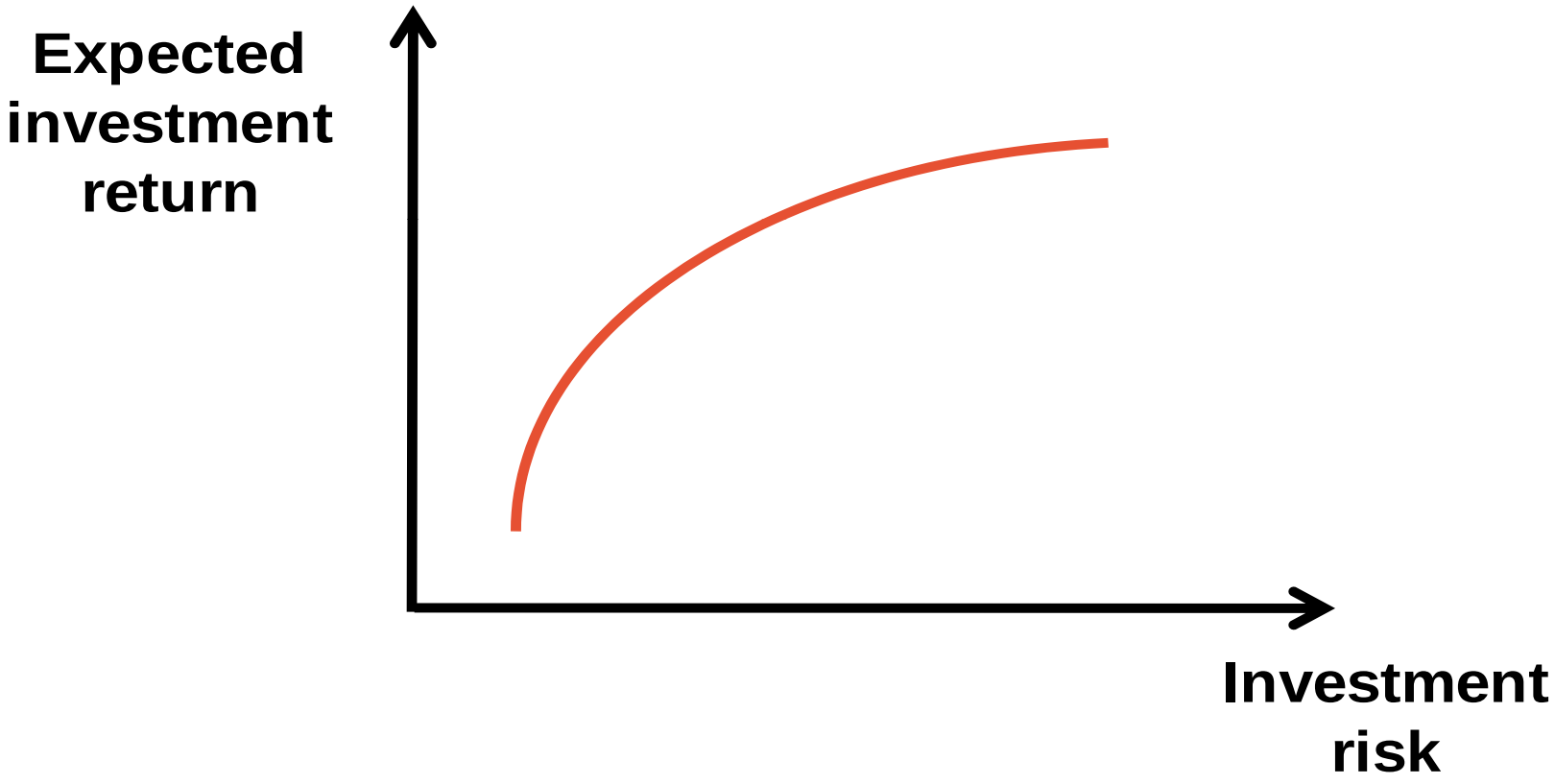
- **Standard deviation (volatility)**: this measure of risk represents the expected variability of returns away from their long run average. The standard deviation is 4% per annum in the example. This means that the investment return will be within +4% or -4% of the average return in about 2 out of every 3 years (i.e. from 2% to 10% per annum).
- **5% TCE**: this more complex measure of risk indicates what the expected investment return is in a poor investment return environment that occurs once every 20 years. In this example the 5% TCE is somewhat worse than -2% per annum.

Interpreting model output

- In presenting our forward-looking analysis, we have ranked the results produced by our stochastic model and have charted the range of likely outcomes, in particular:
  - The median / 50th percentile outcome – in 50 out of every 100 trials we expect an outcome higher than this level and in 50 out of every 100 trials we expect an outcome lower than this;
  - The upper and lower quartiles – in 25 out of every 100 trials we expect an outcome higher than the upper quartile and in 25 out of every 100 trials we expect an outcome lower than the lower quartile; and
  - The 95th and 5th percentile outcomes – in 5 out of every 100 trials we expect an outcome higher than the 95th percentile and in 5 our of every 100 trials we expect an outcome lower than the 5th percentile.



Higher Returns means higher Risk

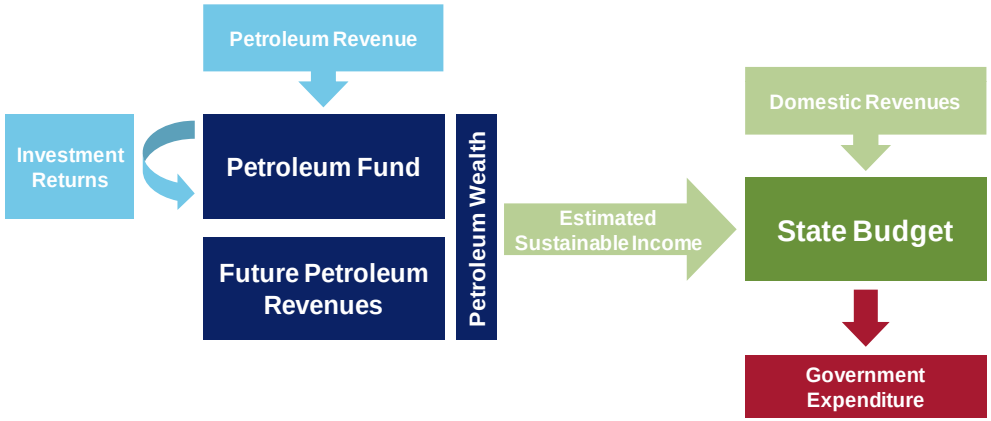


Modelling Approach

Modelling approach

- The model that we have developed is a Monte Carlo simulation based stochastic model of the Petroleum Fund that enables the assessment of the impact of varying oil prices, investment returns, different investment strategies, differing ESI spending rates, and other key parameters.
- A diagrammatic representation of the Petroleum Fund and the way in which it integrates with the State Budget is set out below:

Diagrammatic representation of the Petroleum Fund



- The primary benefits of using the integrated model that we have developed are:
  - Our model integrates the dynamics of both investment returns and petroleum revenues and models the potential interactions between the two and in particular **allows for both investment returns and oil prices to vary stochastically**; and
  - In addition to showing **expected** future outcomes (which are also generated by the existing model used by the Ministry of Finance), our model demonstrates the potential **variation** in outcomes by projecting several thousand potential future realisations and assigns **probabilities** to certain outcomes.

Key Findings

1. Two key policy "levers" - the **spending rule and the investment strategy**.

2. The Key decision is the split between **equity and bonds** – everything else is second order

3. A level of ESI spending will **not** be sustainable unless it is coupled with an investment strategy that expects to achieve a real return consistent with that level of spending.

4. An allocation to equities of **at least** 25% is required to achieve a long term real return of 3% - the current ESI

5. A higher allocation to equities provides a higher long term expected return, but also a higher level of expected **risk**

6. There is a **diminishing marginal benefit** from increasing the allocation to equities.

7. There may be potential diversification benefits from including alternative investments such as real estate, private equity and hedge funds in the portfolio; however allocations to these asset classes also give rise to issues that include the burden on stakeholders' time, higher fees, liquidity risks and general levels of complexity.

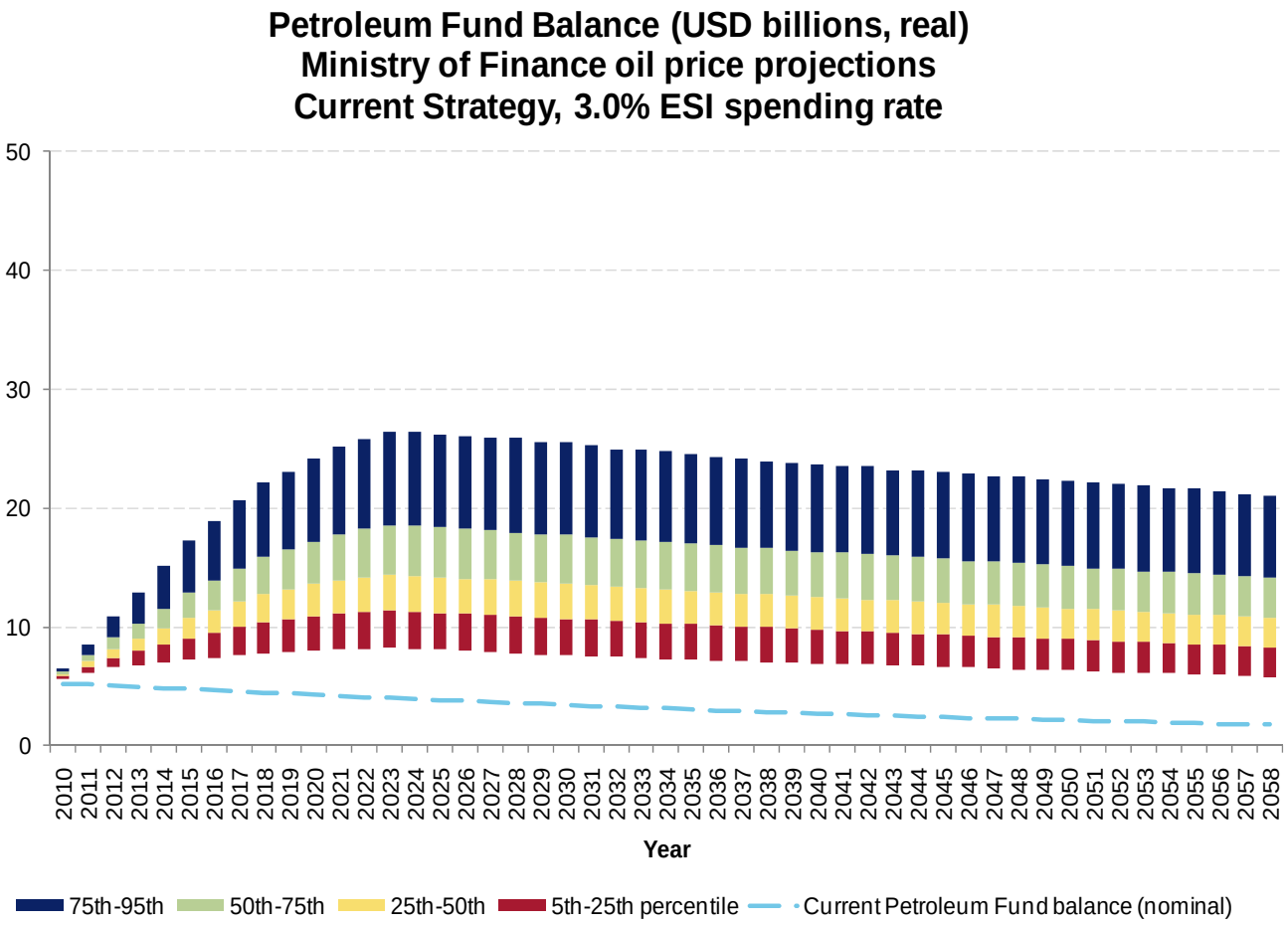
8. Assuming that the current investment strategy is maintained and that the amount transferred to the State Budget in each year is equal to ESI, in 2030 we expect the Petroleum Fund balance will be between USD 7.6 billion and USD 25.5 billion and there is a 5% chance that the real Petroleum Fund balance will be less than USD 7.6 billion.

9. Under the current strategy and spending rule, there is a 5% chance that the ESI in 2020 will be USD 350 million higher or USD 200 million lower than our central estimate of USD 439 million.

10. The "true" underlying currency exposure for Timor-Leste (the major trading partners for Timor-Leste being Indonesia, Singapore and Australia) would tend to suggest that exposure to currencies other than the US dollar would be desirable to preserve the "purchasing power" of the Petroleum Fund.

Current Fund Strategy

The Petroleum Fund under current policy settings

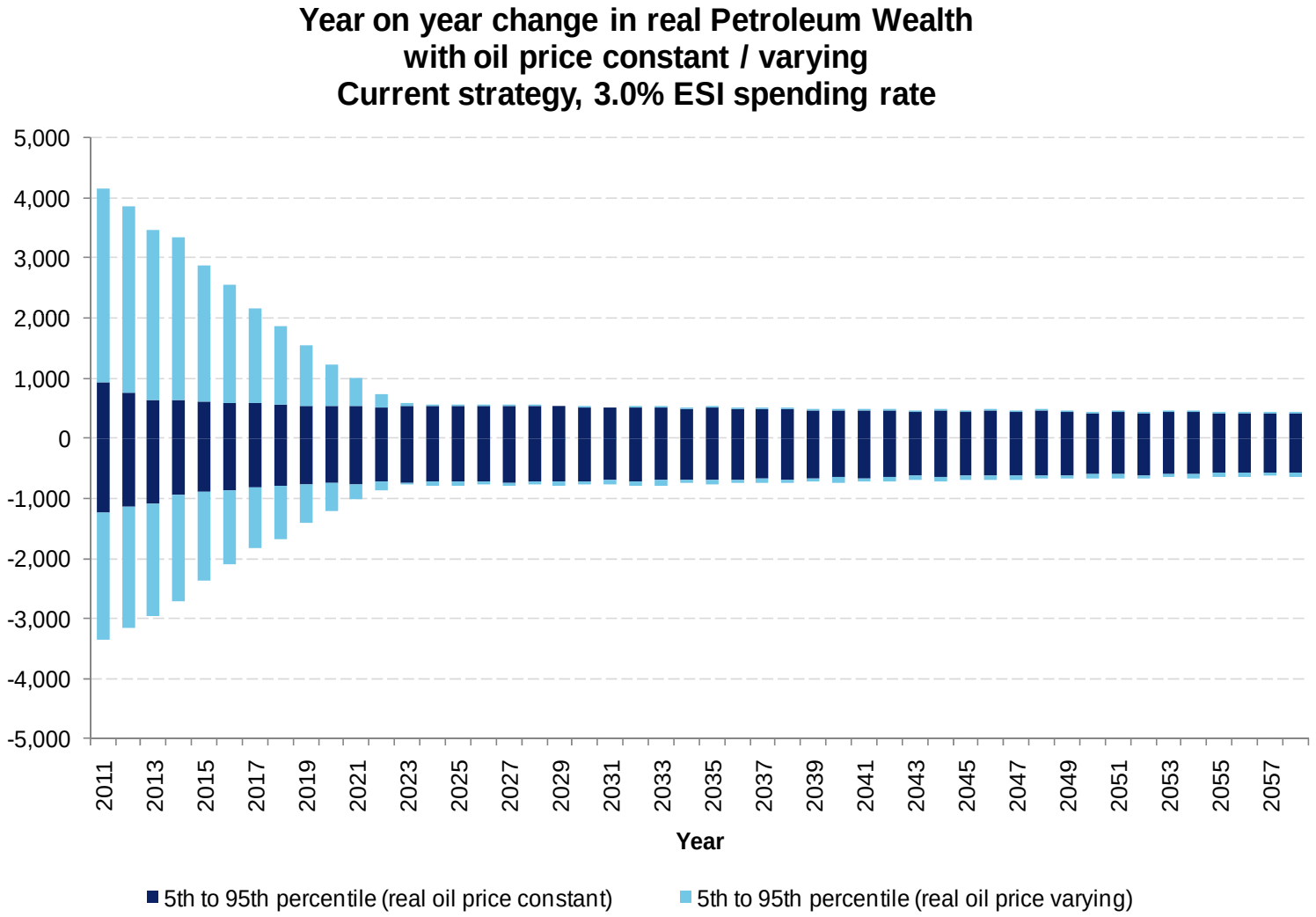


The combination of the current strategy and a 3.0% ESI spending rate is expected to result in Petroleum Wealth and ESI declining in real terms over time.

This decrease occurs because the ESI spending rate (3.0% pa) is higher than the expected long term central real rate of return for the current investment strategy (2.1% pa).

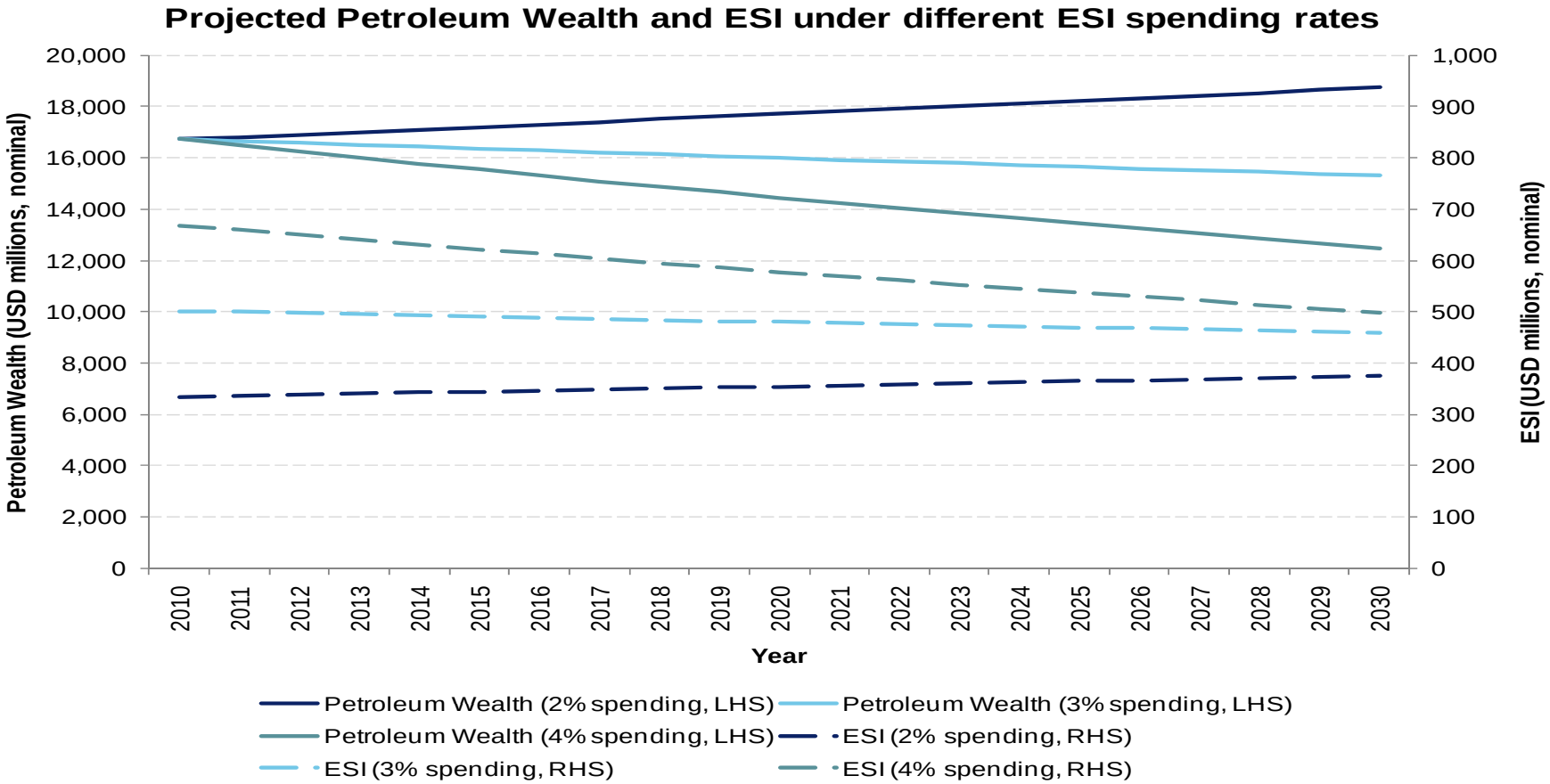
- ***In 2030 there is a 90% chance that the real Petroleum Fund balance will be between USD 7.6 billion and USD 25.5 billion and a 5% chance that it will be less than USD 7.6 billion.***

From oil to financial assets – Transformation of Petroleum Wealth



Sources: Ministry of Finance, Towers Watson

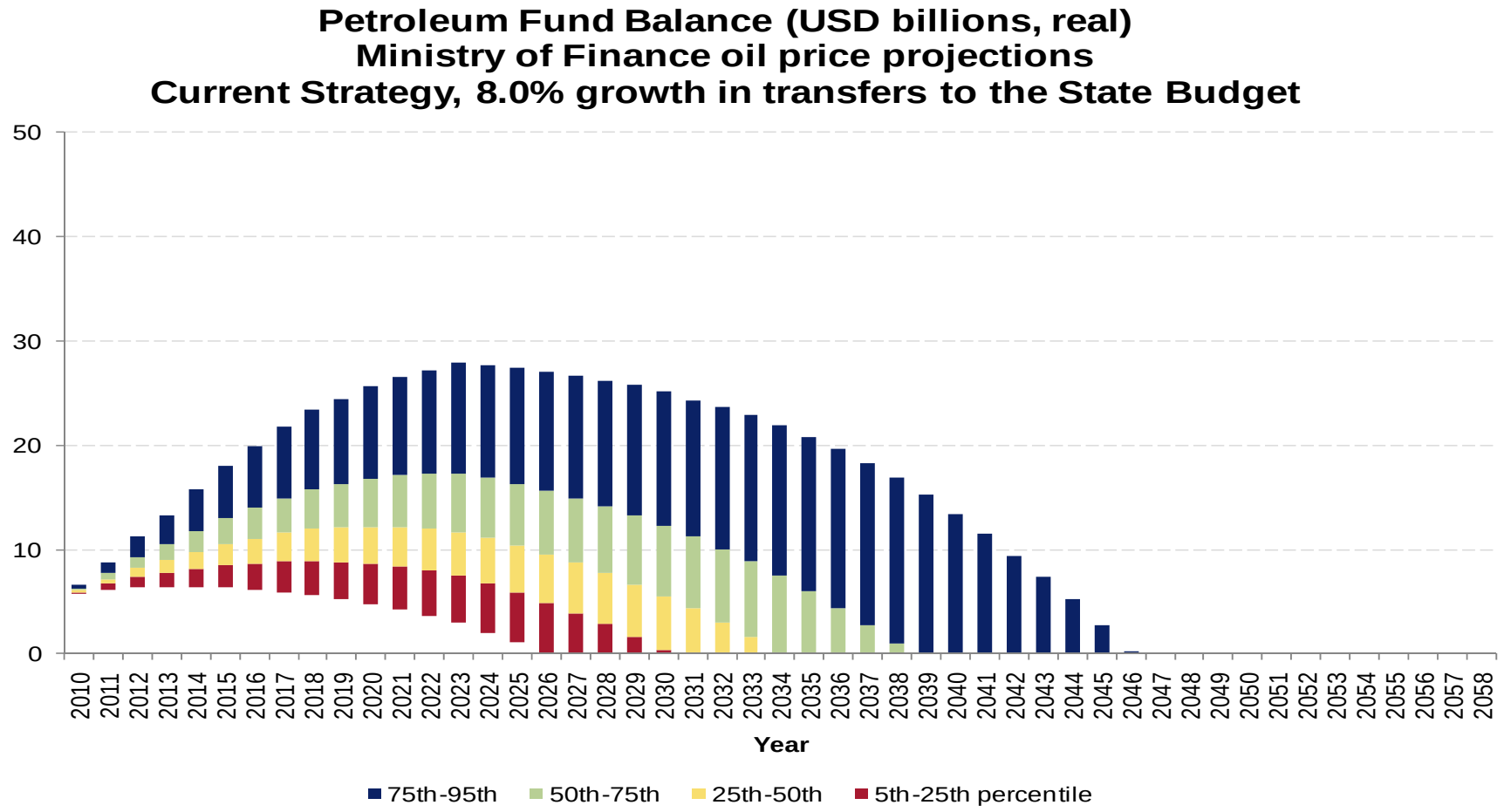
Spending policy



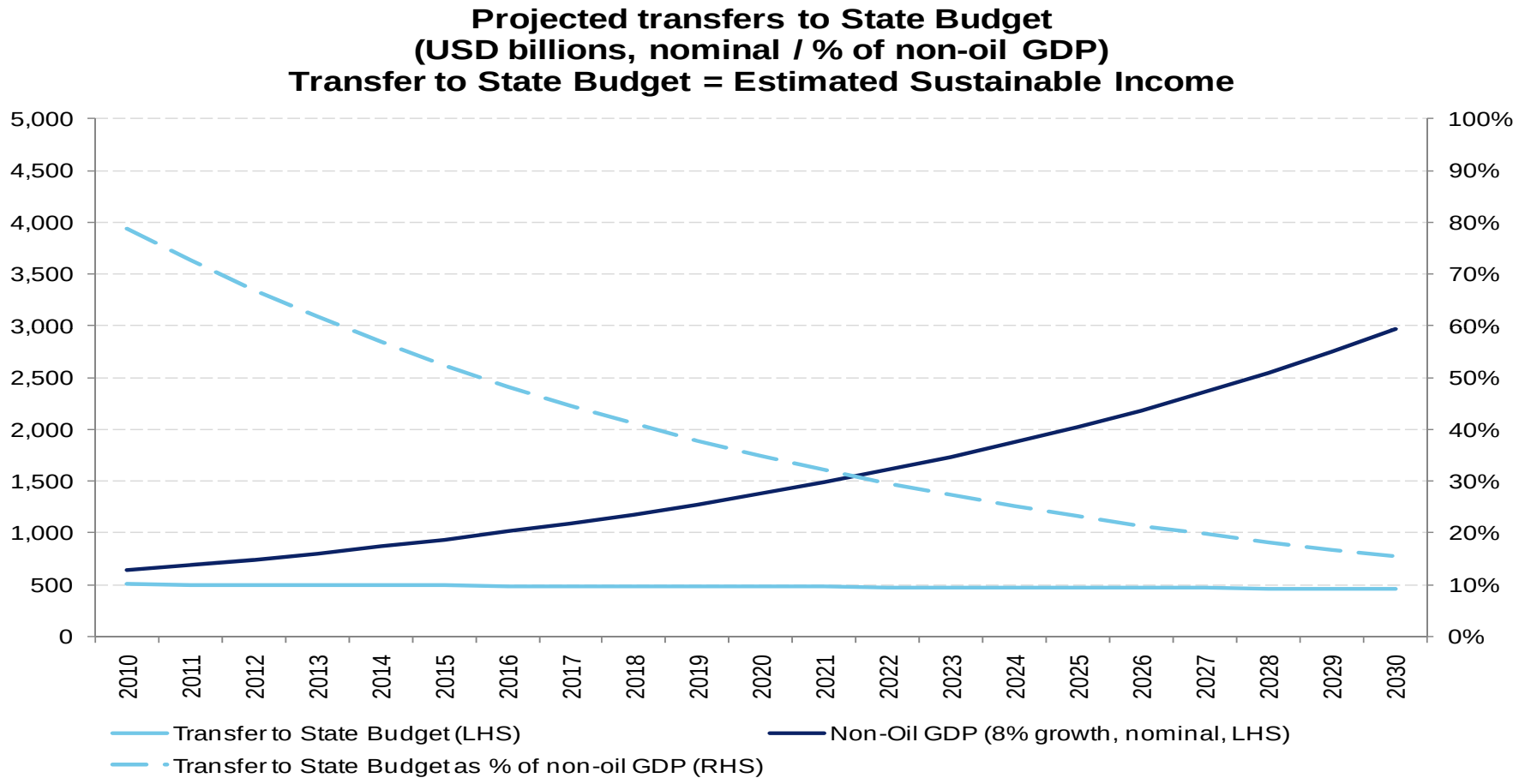
Spending more than what is sustainable now results in lower spending being possible in the future.

Spending less than what is sustainable now means spending can increase in the future.

Impact of using Petroleum Wealth to drive GDP



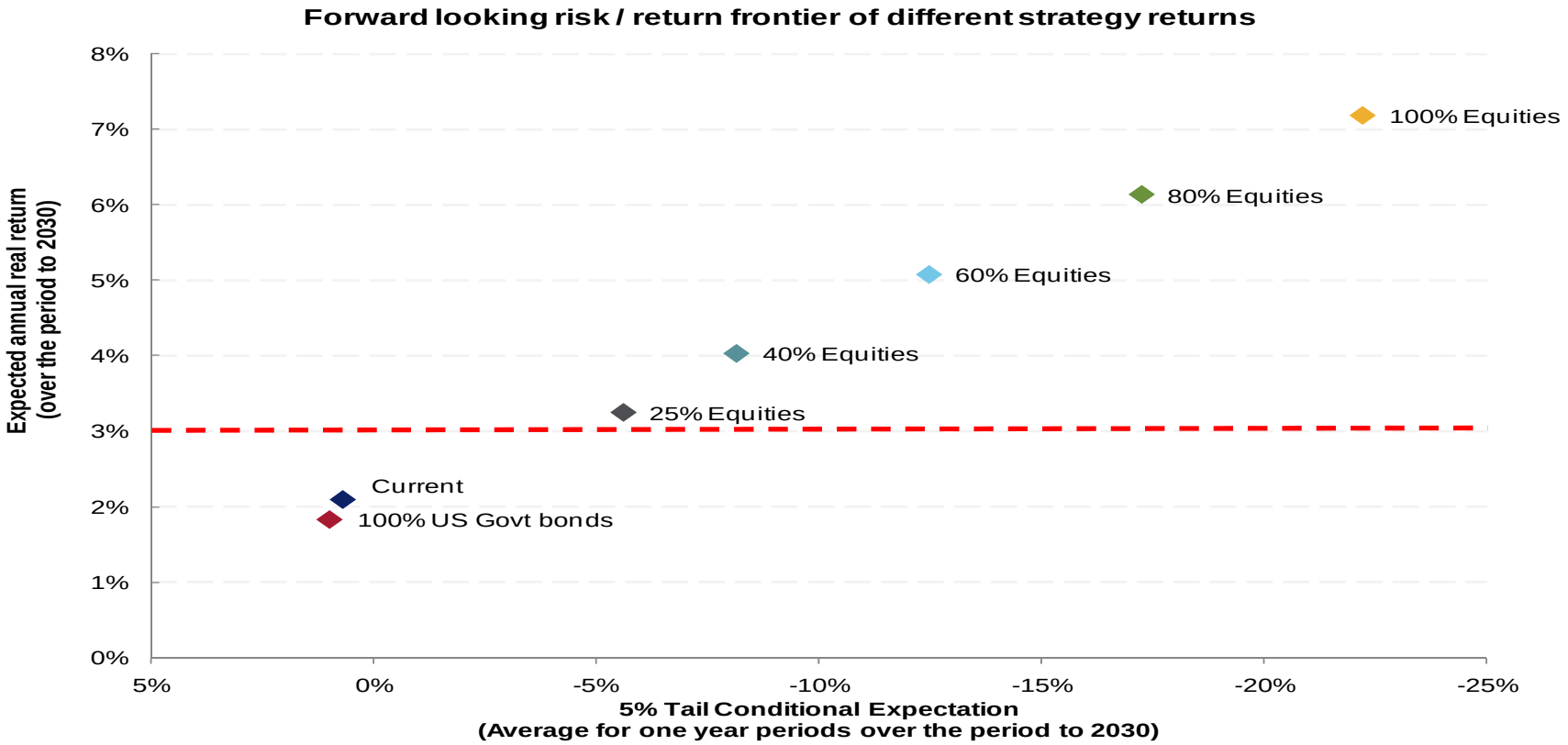
Economic growth and the Petroleum Fund



Transfers from the Petroleum Fund cannot be expected to drive the target rate of economic growth in the long term, since this would require equivalent growth in the real value of the Petroleum Fund of 8% per annum in the long term after allowing for transfers, which is unrealistic under any reasonable long term investment return assumptions.

Different investment strategies – forward-looking analysis

Forward-looking risk / return trade-off



There is a clear trade-off between risk and return – strategies with higher allocations to equities are exposed to higher risk of poor and negative returns in the short to medium term, but are expected to outperform less risky portfolios in the long term.

Forward-looking measures of risk for a range of investment strategies

Investment Strategy	Range of returns in two out of every three years		Frequency of negative returns (years in every 100)	Poor outcome return (5 years in every 100)	
	% pa	USD millions*		% pa	USD millions*
100% 0-5 year US Treasury bonds	2.4% to 5.9%	136 to 332	Very rarely	Return of +1.6% or worse	Gain of USD 87 million or worse
Current	2.4% to 6.5%	135 to 363	1	Return of +1.4% or worse	Gain of USD 77 million or worse
25% Equities	-0.4% to 11.6%	-20 to 650	15	Return of -3.0% or worse	Loss of USD 169 million or worse
40% Equities	-1.4% to 14.3%	-80 to 801	17	Return of -4.4% or worse	Loss of USD 246 million or worse
60% Equities	-3.4% to 18.4%	-188 to 1,030	20	Return of -7.1% or worse	Loss of USD 395 million or worse
80% Equities	-5.5% to 22.7%	-310 to 1,272	23	Return of -10.2% or worse	Loss of USD 569 million or worse
100% Equities	-7.8% to 27.1%	-437 to 1,520	25	Return of -13.5% or worse	Loss of USD 756 million or worse

* Based on an assumed Petroleum Fund balance of USD 5.6 billion

Projected real Petroleum Fund balance and investment return in 2015 under different investment strategies

Petroleum Fund balance in 2015 (USD billions, real)	Investment Strategy					
	Current	100% Bonds	25% Equity	40% Equity	60% Equity	80% Equity
95th percentile	17.2	17.0	18.4	19.5	21.2	23.2
75th percentile	12.9	12.7	13.5	14.2	15.1	16.1
50th percentile	10.7	10.6	11.3	11.7	12.2	12.8
25th percentile	9.1	9.0	9.4	9.6	9.9	10.1
5th percentile	7.3	7.2	7.3	7.3	7.3	7.1
Difference between 95th and 5th percentile	9.9	9.8	11.1	12.2	13.9	16.2

Investment return volatility in 2015 (USD millions, real)	Investment Strategy					
	Current	100% Bonds	25% Equity	40% Equity	60% Equity	80% Equity
95th percentile	971	893	1,768	2,202	2,948	3,780
75th percentile	627	582	971	1,149	1,418	1,738
50th percentile	462	434	578	655	773	884
25th percentile	318	309	231	230	187	118
5th percentile	152	163	-267	-440	-724	-1,104
Difference between 95th and 5th percentile	819	730	2,035	2642	3,672	4,884

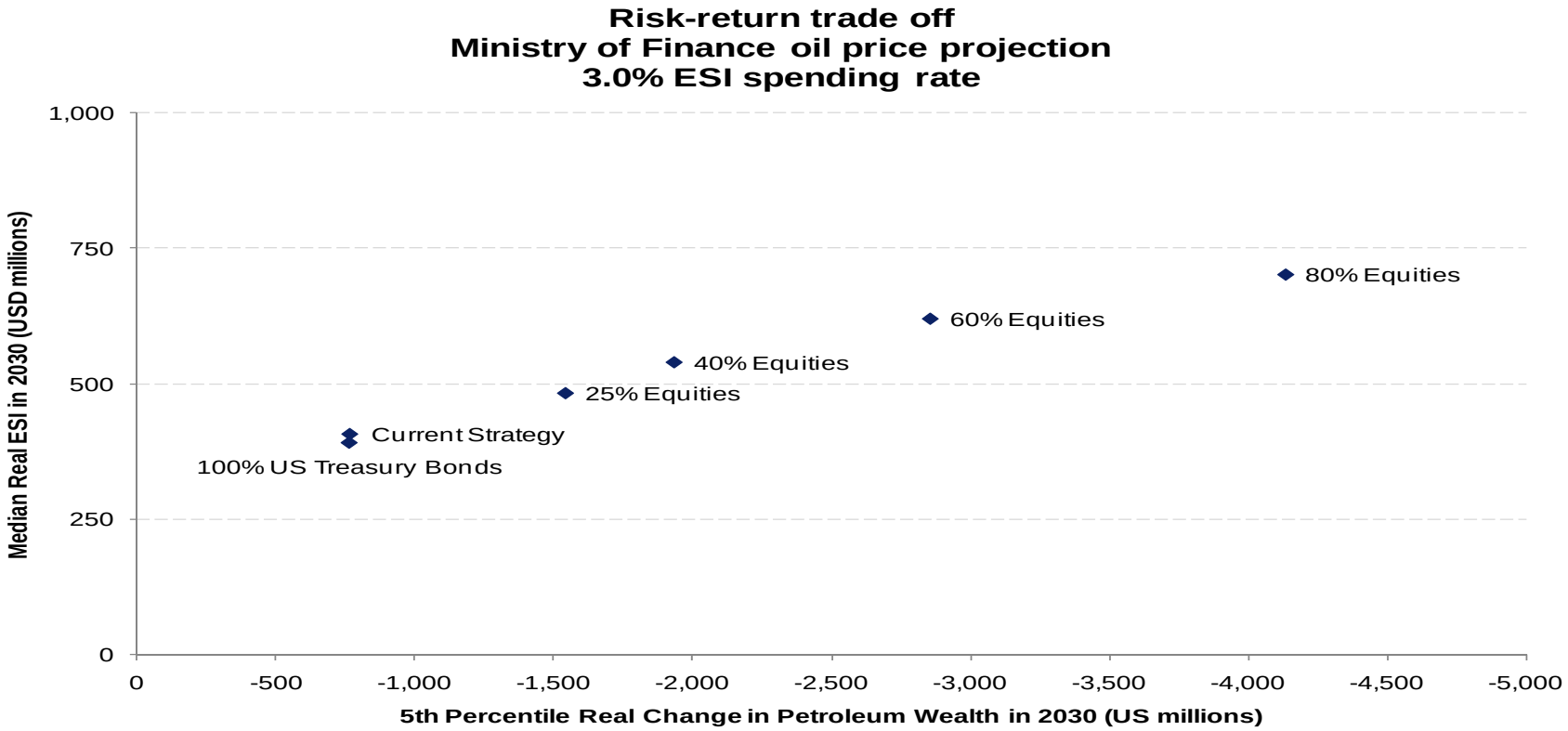
Projected real Petroleum Fund balance and investment return in 2030 under different investment strategies

Petroleum Fund balance in 2030 (USD billions, real)	Investment Strategy					
	Current	100% Bonds	25% Equity	40% Equity	60% Equity	80% Equity
95th percentile	25.5	24.3	31.9	37.6	48.0	63.0
75th percentile	17.7	17.0	21.4	24.4	29.2	35.0
50th percentile	13.6	13.1	16.4	18.4	21.3	24.3
25th percentile	10.7	10.2	12.5	13.8	15.1	16.2
5th percentile	7.6	7.3	8.6	9.1	9.1	9.0
Difference between 95th and 5th percentile	17.9	17.1	23.3	28.5	38.9	53.9

Investment return volatility in 2030 (USD millions, real)	Investment Strategy					
	Current	100% Bonds	25% Equity	40% Equity	60% Equity	80% Equity
95th percentile	1,480	1,332	2,952	3,972	6,046	9,079
75th percentile	883	790	1,534	1,968	2,672	3,607
50th percentile	603	546	856	1,032	1,314	1,584
25th percentile	402	374	317	343	322	221
5th percentile	174	184	-382	-670	-1,340	-2,272
Difference between 95th and 5th percentile	1,306	1,148	3,334	4,642	7,386	11,351

Risk-return trade-off for Petroleum Wealth

- The chart below shows the trade-off between long term expected ESI and the risk of a short term drop in Petroleum Wealth (and hence ESI):



The choice of investment strategy is then a trade-off between the expected future level of ESI and the level of potential downside risk over short time periods and will be dependent on the risk tolerance of the key stakeholders and also their target level of future spending.

The ESI spending rule and investment strategy need to be considered in tandem

Impacts

Impact of the worst four annual returns since 1900 on the Petroleum Fund balance (USD millions)

Investment strategy	Worst year	2nd worst year	3rd worst year	Year ending 28 February 2009
100% Treasury bonds	1969	1994	1959	331
	-349	*-226*	*-188*	
Current	1969	1994	1966	194
	-349	*-209*	*-152*	
25% Equities	1931	1974	1930	-486
	-631	*-483*	*-375*	
40% Equities	1931	1974	1930	-932
	-1,039	*-868*	*-721*	
60% Equities	1931	1974	1930	-1,400
	-1,559	*-1,344*	*-1,168*	
80% Equities	1931	1974	1930	-1,977
	-2,051	*-1,781*	*-1,596*	
100% Equities	1931	1974	1930	-2,426
	-2,514	*-2,181*	*-2,005*	

Sources: Federal Reserve, Global Financial Data, Datastream, Towers Watson
Current Petroleum Fund balance assumed to be USD 5.6 billion

Impact of changing policy levers: impact of changing investment strategy

- Distribution of ESI in 2030 (in real terms) across a range of investment strategies, assuming that the ESI spending rate is maintained at 3.0%:

Estimated Sustainable Income in 2030 (USD millions, real)	Investment Strategy					
	Current	100% US Treasury Bonds	25% Equities	40% Equities	60% Equities	80% Equities
95th percentile	758	729	938	1,101	1,380	1,775
75th percentile	527	507	628	714	851	1,013
50th percentile	**408**	**392**	**483**	**540**	**621**	**702**
25th percentile	320	307	373	405	445	474
5th percentile	228	218	255	268	275	272
Difference between 95th and 5th percentiles	**531**	**511**	**683**	**832**	**1,105**	**1,503**

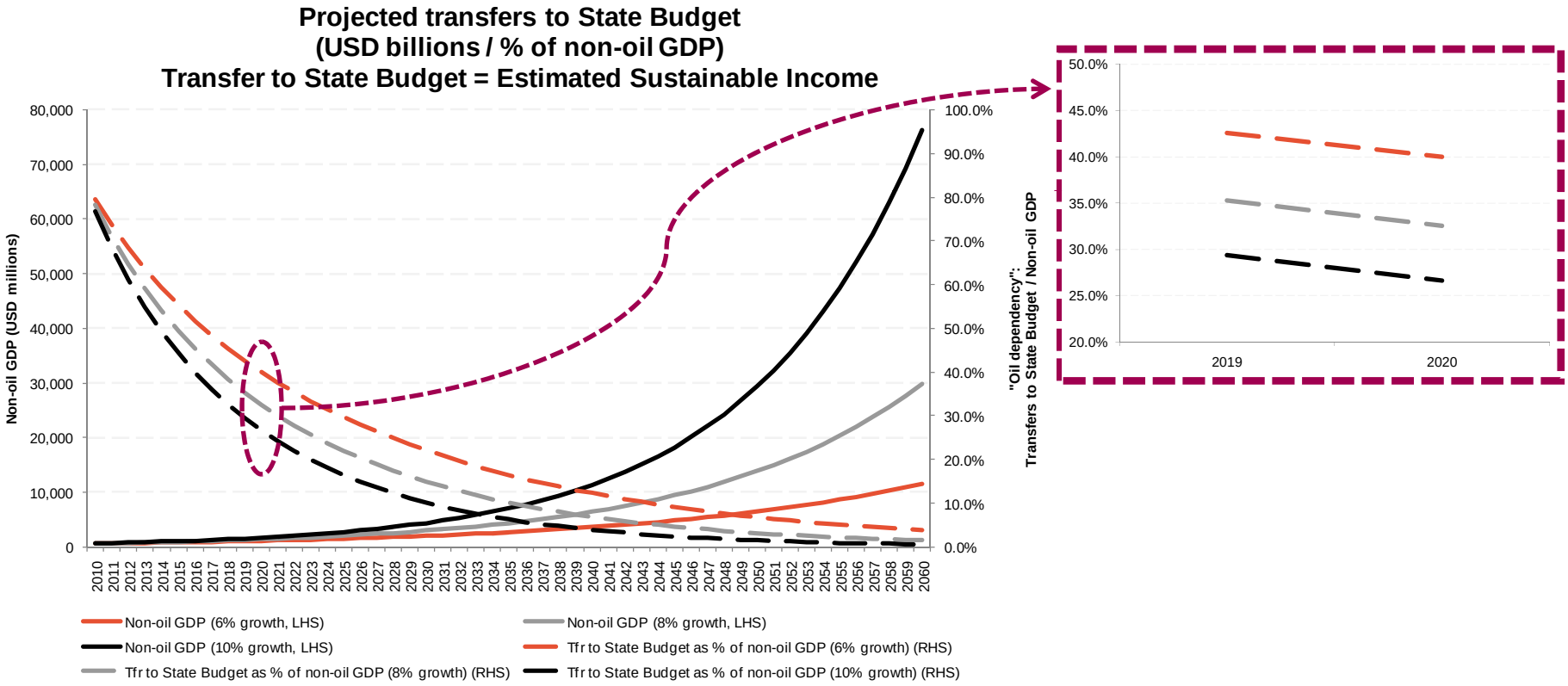
Increasing median ESI

Increasing potential variability of ESI

Whilst increasing the amount of investment risk in the Petroleum Fund portfolio increases the amount of expected ESI, consistent with the asset only modelling, it also increases the potential variability of ESI.

Impact of different economic growth scenarios

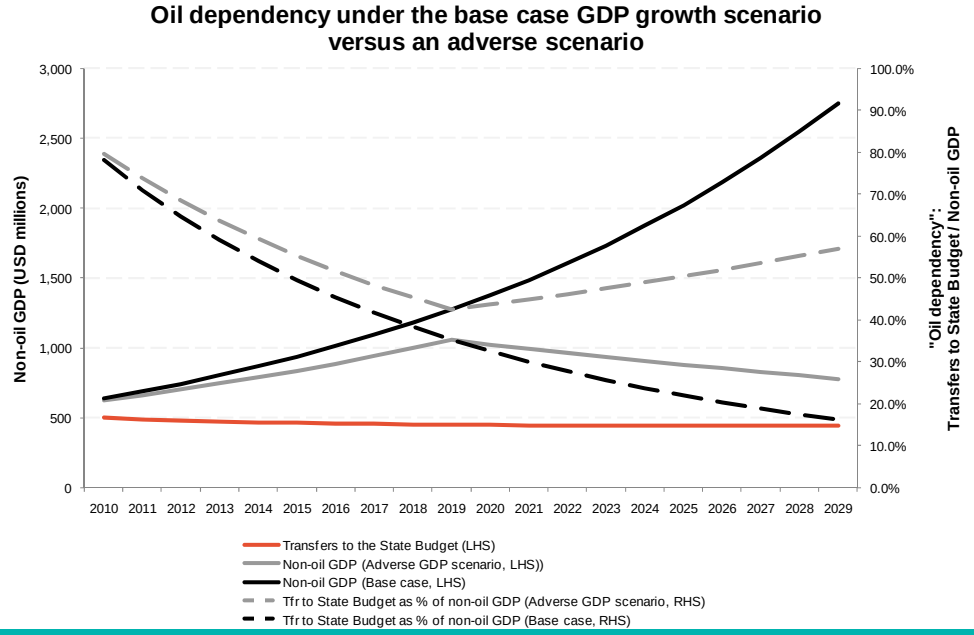
- We consider the impact of three differing growth rates for non-oil GDP growth: 6%, 8% and 10% per annum.



Different rates of long term economic growth lead to significant differences in the level of oil dependency over time. However, in the very long run, each assumed rate of GDP growth leads to a low level of dependency.

Impact of adverse economic growth

- We believe that whilst the Timor-Leste economy is growing strongly at present, it is important to consider scenarios in which the longer term growth rate does not achieve current aspirations.
- Purely for demonstration purposes, consider an adverse scenario where real GDP growth is 6% pa for the first 10 years, and then the economy suffers from a prolonged recession, and real GDP growth is -3% pa for the next 10 years.
- The following chart shows the potential impact of this adverse non-oil GDP growth scenario on oil dependency compared to the base case (GDP growth of 8% pa):

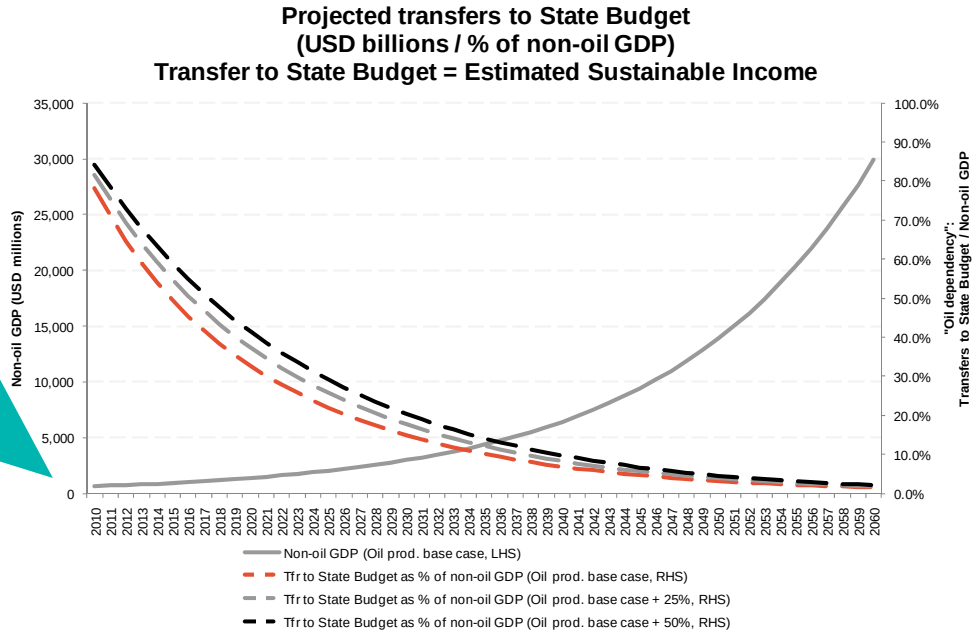


An adverse scenario under which Timor-Leste's non-oil GDP falls during some future period should be considered. Under this scenario, Timor-Leste's dependency on petroleum would likely rise.

Oil production or price scenarios and oil dependency

- In the following chart we have considered the impact of higher oil production on “oil dependency”.

There are differences in non-oil GDP under the different production scenarios, however since most of non-oil GDP is assumed to be derived from non-ESI sources over time, then these differences are not significant on the scale of this chart



- Higher rates of oil production result in a higher level of “oil dependency”. This is because transfers to the State Budget increase while the component of non-oil GDP that does not relate to government spending is assumed to grow independently of petroleum revenues, therefore resulting in spending being a higher proportion of non-oil GDP.
- However, since transfers to the State Budget are projected to be relatively stable over time, their share of non-oil GDP diminishes as non-oil GDP grows and therefore the levels of “oil dependency” under each scenario converge over time and approach zero.

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