Research

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USA: The risk of a US recession

- The debate about the likelihood of a US recession has recently flared up again. Many have referred to the inversion of the US yield curve as a sign of a slump to come in the US economy. Several studies have found that yield curve inversions are indeed a strong predictor of US recessions, with a lead of up to 12 months.

- In a paper issued in March, we argued that the yield curve might be a biased estimator given the circumstances at the time. We presented four alternative early warning indicators for US recessions, and showed that none of them supported a recession call back then.

- In this report we update and underpin these conclusions statistically. We estimate probit models for the likelihood of a US recession on different time horizons based on: 1) The yield curve alone 2) The yield curve and other financial market variables 3) The four real economic indicators mentioned above, and 4) All the variables mentioned plus building permits.

- Using the yield curve only, a probit model signals a recession probability of 30% during the next 12 months. However, the yield-curve-based probit model tends to send false signals in the 1960s and the late 1990s – i.e. in periods of low inflation. Enhancing the probit model with other financial variables gives broadly the same results, thus the yield curve is clearly the best financial indicator of recession.

- Using, instead, the four above-mentioned real economic indicators for recessions in a probit model, we obtain a substantially better fit. This model gives a 0% recession risk on the 3-, 6- and 12-month horizons at the present juncture.

- Combining the financial and the real economic variables with building permits – to capture the negative housing market developments – our all-encompassing probit model yields the same surprising result: 0% recession risk on a 12-month horizon!

- We conclude that there is not much risk of recession in the US right now. The main reasons are: A low real fed funds rate, very low business spending and a limited drop in private savings in recent years. This result indirectly supports the notion of a "bond yield conundrum", as the yield curve seems to be too flat (or rather inverted) in the present situation compared to other reliable recession indicators.

The probability of a US recession

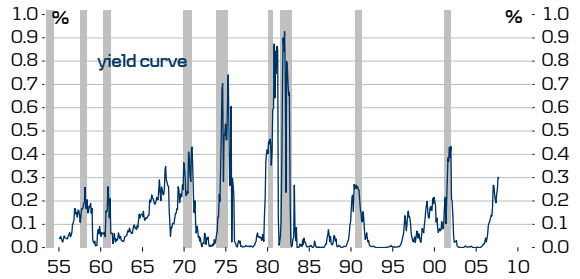
Point of departure

There has been a heated debate lately about whether the US economy is heading towards a recession or not. Earlier this year we published "*Research: USA Recession checklist",* in which several recession indicators were listed. The paper concluded that the risk of a recession was small, at least in year ahead. Moreover, it questioned the yield curve as a reliable indicator in the situation at the time. The present paper can be seen an extension of the earlier one. Using a probit model[1], we show that the risk of a recession is minimal and thereby confirm that the recession signals being sent by the inverted yield curve in the present situation are probably false[2].

The yield curve as a recession predictor

It is well known that the yield curve has historically been a good leading indicator for US recessions. We start by estimating a probit model using the yield curve as the sole explanatory variable of US recessions on a 12-month horizon. This model suggests a 30% likelihood of recession in the next 12 months. This is illustrated in the chart below.

Yield-curve



[1] $P(recession_{t,t+h}=1|X_t)=F(\alpha+\beta X'_t)$ Where X'_t is the set of explanatory variables, β is the corresponding coefficients and α is the constant. "Recessiont,t+h" is a dummy variable that contains 1 for recessionary month and 0 otherwise.

[2] The probit model is constructed using eight financial and non-financial variables:
First the financial variables: 1) Yield-spread, S, which represents the difference between the Constant Maturity Yields, 10 year, Average and the 3-Month Treasury Yield, Discount Basis (10Y-3M) (The 3-month yield is converted from discount basis to bond equivalent basis by applying the following transformation: 100*(365*discount/100)/(360-91*discount/100), where "discount" is the discount yield). The yield curve is then estimated in combination with 2) credit-spread (Moody's Baa minus Aaa) and 3) the rate of change in nominal S&P500.
Then the economic fundamentals; 4) real fed fund (Based on annual core CPI inflation), RR, 5) the difference between the fed funds rate and the nominal GDP, FFNG, 6) business spending (As percentage of cash flow), BS, and 7) percentage change in savings (Savings represent the 5-year change in private savings as percentage of GDP.), SAV are regressed.
Finally, a combination of the financial variables and economic fundamentals are estimated together with 8) building permits, which is a proxy for the housing market. Real GDP is regressed upon these variables in a probit model as referred to in note 1. The recession dummy is constructed by using the definition composed by NBER and the estimation period span from 1961, 7M to 2006, 7M and the forecasting period is respectively 3M, 6M, 12M and 24M.

Moreover, the model has sent misleading signals, most recently in the late 90s and before that in the late 60s. The yield curve seems to be more reliable as a leading indicator when inflation and bond yields are high than when they are low.

The financial market

To extend our analysis, the yield curve estimation is expanded to include the Moody's credit-spread and the S&P500. This model is constructed to quantify the signals sent by the financial market. In the table below we present the results of using the three individual recession indicators separately.

The risk indicated by the financial market

Probit models for a recession over the next 3M, 6M, 12M and 24M

		3M	6M	12M	24M
Yield-curve	α	-0.73	-0.66	-0.66	-0.94
	β	-0.48	-0.72	-0.76	-0.2
	t-value	-7.62	-8.78	-8.87	-3.75
	P	26.50%	30.60%	30.90%	18.43%
S&P500	α	-1.03	-1	-1.14	-1.14
	β	-0.05	-0.03	0.001	0.002
	t-value	-8.76	-6.45	***0.1***	***0.5***
	P	8.00%	10.80%	12.60%	12.40%
Moody's Credit spread	α	-1.89	-1.15	-1.12	-1.14
	β	0.006	0.003	0.002	0.002
	t-value	3.66	***1.53***	***-0.66***	***1.11***
	P	3.00%	12.60%	13.10%	12.80%

Source: own calculations
Note: the variables in bold italics are insignificant

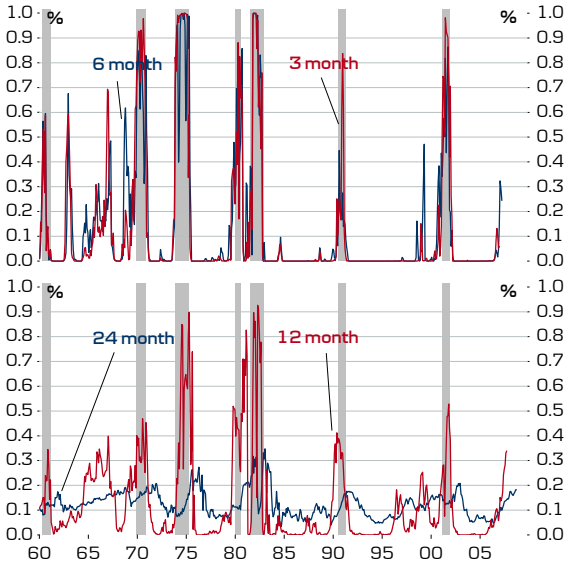
The coefficients and the corresponding t-values are reported. Moreover, the probabilities for a recession according to the individual variables on the 3-, 6-, 12- and 24-month horizons can be seen in the shaded area.

Looking at the t-values, it is observed that the yield curve is significant on every forecast horizon. Moreover, the yield curve clearly gives a higher probability of a recession than the other two financial variables.

We then tested the forecasting ability when the financial variables are combined. The result is very similar to what we experienced by estimating a probit model using just the yield curve.

The signals sent by the financial market about the probabilities of a recession in the next 3M, 6M, 12M and 24M are illustrated in the chart below.

Financial market



The combined probit model using financial market variables yields high probability of a recession during the next year. This is not surprising, since the yield curve coefficient is large compared to the other two variables. The false spikes in the late 60s and 90s are still apparent, although the model has improved slightly. To overcome the problem of the false spikes and to determine whether the yield curve and the financial market are right, we return to the four recession predictors presented earlier in "*Research: USA Recession checklist*".

Economic fundamentals

Up to this point we have mainly focused on the ability of the yield curve as a predictor of US recessions. The yield curve has signalled a rather high probability of a recession within the next year, but as we demonstrated earlier this year there are other "games in town". These variables are the real fed funds rate, fed funds rate minus nominal GDP, business spending to cash flow rates, and change in private savings[3].

Risk indicated by economic fundamentals

Probit models for a recession over the next 3M, 6M, 12M and 24M

		3M	6M	12M	24M
RR	α	-1.69	-2.13	-1.77	-1.12
	β	0.23	0.37	0.26	-0.02
	t-value	6.19	8.15	6.64	***-0.54***
	P	13.50%	11.80%	13.20%	12.23%
FFNG	α	-1.23	1.15	-1.08	-1.18
	β	0.31	0.24	0.08	-0.02
	t-value	8.92	8.39	3.72	***-0.86***
	P	3.20%	5.20%	10.70%	12.70%
BS	α	-11.2	-10.72	-8.23	-3.99
	β	0.08	0.07	0.05	0.02
	t-value	10.4	10.3	9.39	4.93
	P	0.02%	0.30%	0.30%	4.30%
SAV	α	-1.17	-1.22	-1.41	-1.15
	β	-0.08	-0.13	-0.3	-0.01
	t-value	***-1.77***	-2.94	-6.03	***-0.05***
	P	11.20%	9.80%	5.70%	12.50%

Source: own calculations
Note: the variables in bold italics are insignificant
RR = Real fed funds rate deflated by core CPI
FFNG = Nominal fed funds rate minus nominal GDP
BS = Business spending to cash flow
SAV = 5-year change in private savings as percentage of GDP

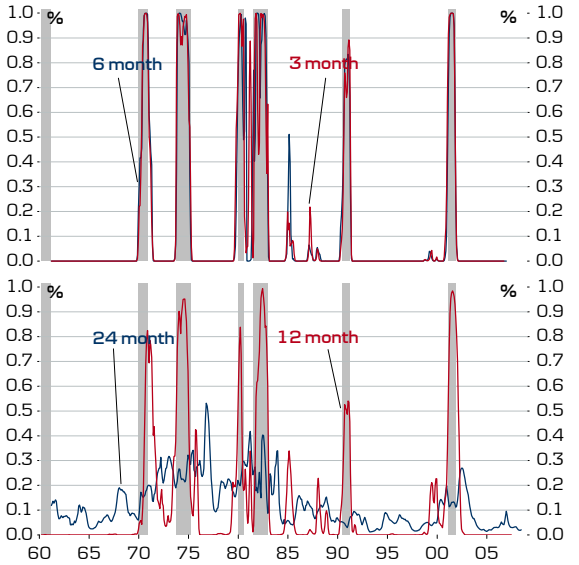
In the table above, the probabilities of a US recession – according to these four variables – are given in the shaded areas. The constant, a coefficient and the t-values are also shown. All variables are significant except for RR 24M, FFNG 24M and SAV 3M and 24M. The probabilities for a US recession shown in the table range from 0.3% for the business spending indicator to 13.2% using the real fed funds rate on a 12M horizon. One of the noteworthy observations is the very low probability of a recession according to business spending. This variable reflects that business balance sheets are well consolidated and very robust, while investment levels are low.

This table confirms the results obtained in our previous paper on this topic. The more fundamental variables are not sending strong recession risk signals, in contrast to the signals sent by the yield curve. The fed funds rate is still below nominal GDP and will most likely stay there until the real fed funds rate reaches its critical level above 3%. The rate of business spending is far below the critical level of 130% of cash flow. Moreover, the change in private savings does not send a significant signal about a forthcoming recession, since savings have risen by 0.6% of GDP over the past few years and not dropped 2%, which historically has been the critical level.

Combining the four variables in a probit model gives a result that is in sharp contrast to the yield-curve-based model.

[3] These variables were discussed in Research: USA: *"Recession checklist"*, published March 01, 2006

Economic fundamentals



The above chart illustrates the probability of a recession using the four fundamental variables. As can be seen, the risk of a recession is practically zero at present and the explanatory power is much better than of the yield curve or financial-variable-based models.

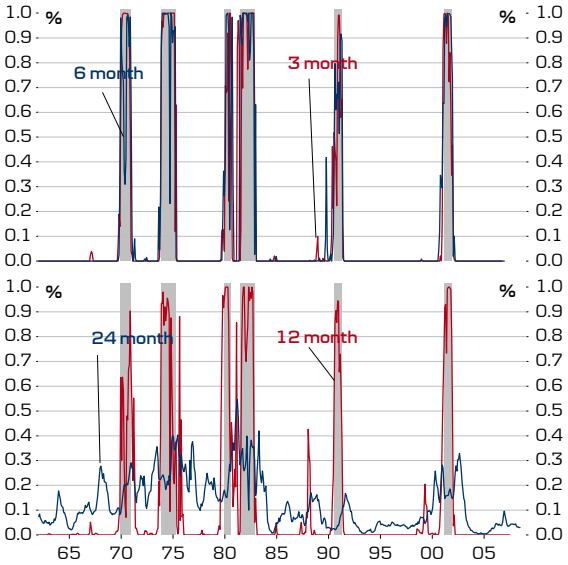
Moreover, the fundamentals do not present such strong false spikes in the late 60s and 90s, and they predict every recession with a probability of more than 50% 12 months ahead. As a minimum, they signal a 90% probability of a recession 3 months before it starts. This confirms the conclusion in *"Research: USA, Recession checklist"*, and the difference compared to the yield curve suggests a bias in the signal sent by either the fundamentals or the yield curve in the present situation.

The misleading yield curve

We now have two models predicting two different outcomes. One of the models must therefore be misleading. To assess which data set is best, we combine all the variables in one model. Further, we add building permits as a proxy for the housing market.

This model also signals a 0% likelihood of a recession, as shown in the chart below.

Financial market and economic fundamentals



Moreover, the model is rather similar to what we obtained using the fundamental variables alone – a good fit and no notable false spikes, except in the late 80s on the 12-month horizon. Additionally, the combined model predicts all historical recessions 3, 6 and 12 months ahead with a minimum probability of no less than 90%.

This suggests that the yield curve is the odd man out in the present situation.

Concluding comments

The yield curve, which is often used as a leading indicator, is presently inverted. This inversion normally indicates that the economy is facing a large risk of recession within one year. However, the yield curve does not currently fit well with other reliable recession indicators. This would normally suggest that there is a "bond yield conundrum", and the reliability of the yield curve as a recession predictor can thus be called into question at the present juncture.

Combining economic and financial data in a probit model strongly suggests that the economy is not heading for a recession. Further, the financial market seems to be sending a misleading signal due to the low level of long bond yields given current fundamentals.

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