Asset Prices
and
Recessions

John C.
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Marco E.
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Conclusion

Do Asset Price Drops Foreshadow Recessions?

John C. Bluedorn[1]   Jörg Decressin[1]   Marco E. Terrones[1]

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Empirical and theoretical links

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    - Negative wealth effect on households, dampening consumption.
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  - Asset prices affect current and future aggregate demand.
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    - Negative effect on firms' and banks' balance sheets, reducing investment and lending.
  - Asset prices are forward-looking, reflecting future economic conditions. Changes in asset prices contain information about future growth.

Key questions and our findings:

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- Does the nature of the relationship between asset price drops and downturns change with the severity of recessions?
  - Yes. Equity price drops are even more strongly associated with severe recessions.

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  - Explore non-linearities in the relationship between equity prices and recessions.

- Sample consists of the G-7 economies, covering 1970:Q1-2011:Q4.

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- Core data include:
  - Cyclical peaks and troughs of seasonally-adjusted real GDP, identified by the Bry-Boschan/Harding-Pagan algorithm.
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- Cyclical peaks (binary) conditional on being in expansion.

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- Cyclical peaks (binary) conditional on being in expansion.
- Panel logit

$$P\left(r_{i,t}|x_{i,t-1}\right) = \frac{\exp\left(x'_{i,t-1}\beta\right)}{1 + \exp\left(x'_{i,t-1}\beta\right)}$$

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- Cyclical peaks (binary) conditional on being in expansion.
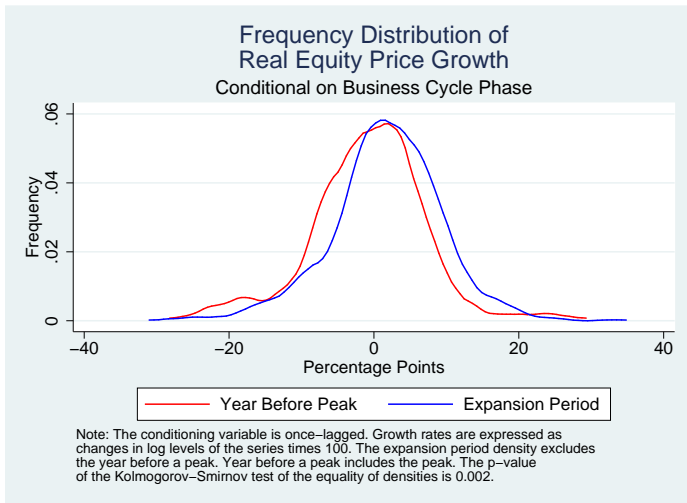- Panel logit

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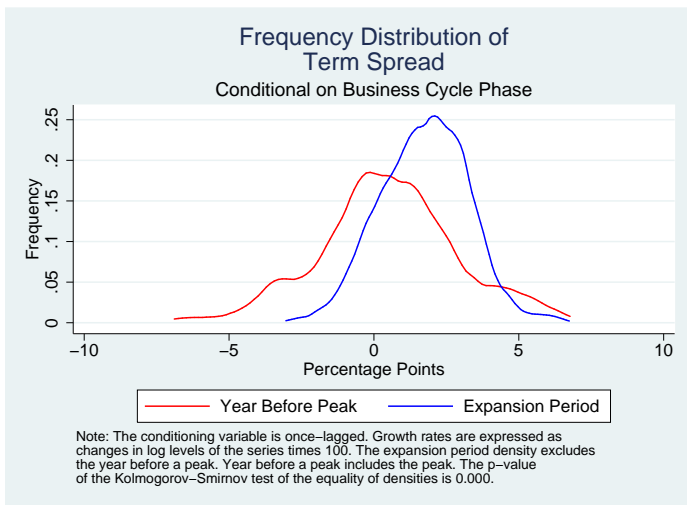$$P\left(r_{i,t}|x_{i,t-1}\right) = \frac{\exp\left(x'_{i,t-1}\beta\right)}{1 + \exp\left(x'_{i,t-1}\beta\right)}$$

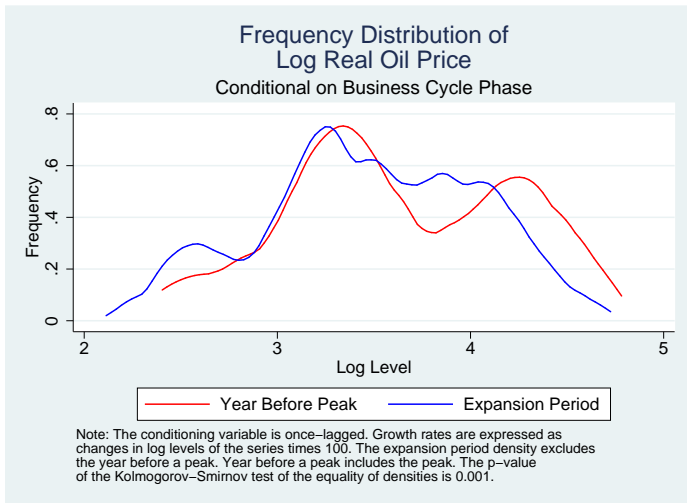- Country fixed effects and quarterly dummies included in all specifications unless otherwise indicated.
- All explanatory variables are **once-lagged** unless otherwise indicated.

Frequency Distribution of
Real Equity Price Growth
Conditional on Business Cycle Phase

Note: The conditioning variable is once–lagged. Growth rates are expressed as
changes in log levels of the series times 100. The expansion period density excludes
the year before a peak. Year before a peak includes the peak. The p–value
of the Kolmogorov–Smirnov test of the equality of densities is 0.002.

Frequency Distribution of
Term Spread
Conditional on Business Cycle Phase

Note: The conditioning variable is once–lagged. Growth rates are expressed as
changes in log levels of the series times 100. The expansion period density excludes
the year before a peak. Year before a peak includes the peak. The p–value
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Frequency Distribution of
Log Real Oil Price
Conditional on Business Cycle Phase

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changes in log levels of the series times 100. The expansion period density excludes
the year before a peak. Year before a peak includes the peak. The p–value
of the Kolmogorov–Smirnov test of the equality of densities is 0.001.

Frequency Distribution of
Real House Price Growth
Conditional on Business Cycle Phase

Note: The conditioning variable is once–lagged. Growth rates are expressed as changes in log levels of the series times 100. The expansion period density excludes the year before a peak. Year before a peak includes the peak. The p–value of the Kolmogorov–Smirnov test of the equality of densities is 0.575.

Frequency Distribution of
Negative Real Equity Price Growth
Conditional on Business Cycle Phase

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Baseline model

Predicting Recessions in the G-7
Baseline Results, 1970:Q1-2011:Q4

	Logistic Regression Model						
Explanatory Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Real Equity	-0.0832***					-0.328***	-0.312***
Price Growth	(0.0216)					(0.0991)	(0.0998)
Term Spread		-0.529***					-0.463***
		(0.1700)					(0.1770)
Log Real			0.856***				0.948***
Oil Price			(0.2510)				(0.2560)
Real House				0.0126			0.003
Price Growth				(0.0416)			(0.0408)
Negative Real Equity					-0.0792**	0.301***	0.281***
Price Growth					(0.0323)	(0.1140)	(0.1040)
No. of Obs.	948	948	948	948	948	948	948
AUC	0.787	0.77	0.733	0.703	0.749	0.799	0.844

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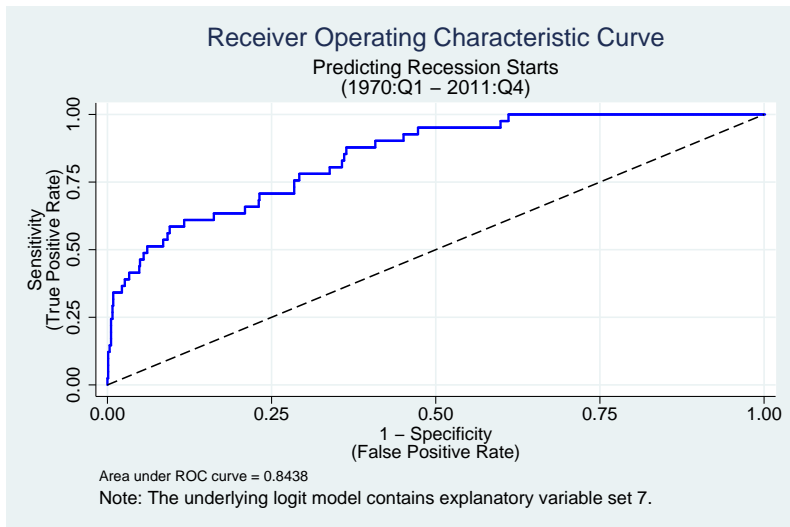Recessions

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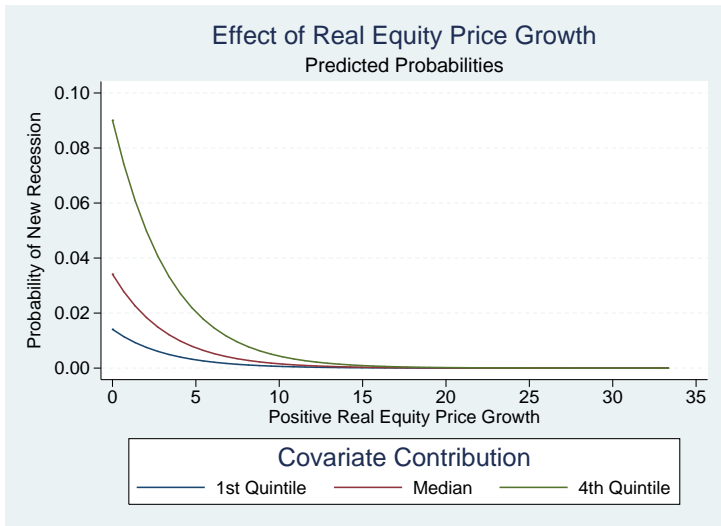
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Baseline model

Receiver Operating Characteristic Curve

Predicting Recession Starts
(1970:Q1 – 2011:Q4)

Area under ROC curve = 0.8438
Note: The underlying logit model contains explanatory variable set 7.

Effect of Real Equity Price Growth
Predicted Probabilities

Covariate Contribution
1st Quintile — Median — 4th Quintile

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Marginal effects of equity prices

Effect of Real Equity Price Growth
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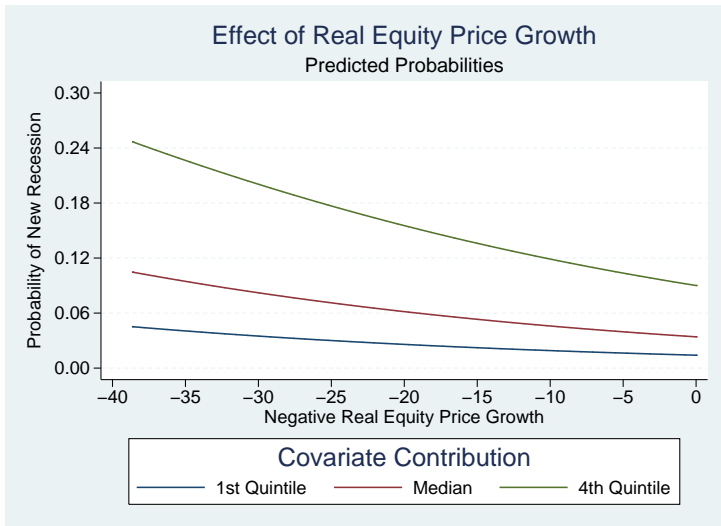Contributions

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Estimation method

Predicting Recessions in the G-7

Robustness to Estimation Method, 1970:Q1-2011:Q4

		Estimation Method		
		Firth's Bias	Complementary	King and Zeng's
Explanatory Variable	Baseline	Correction	Log-Log	Correction
Real Equity	-0.312***	-0.278***	-0.308***	-0.277***
Price Growth	(0.0998)	(0.1010)	(0.0985)	(0.0930)
Term Spread	-0.463***	-0.440***	-0.412***	-0.439***
	(0.1770)	(0.0983)	(0.1580)	(0.1140)
Log Real	0.948***	0.902***	0.951***	0.903***
Oil Price	(0.2560)	(0.3180)	(0.2310)	(0.3130)
Real House	0.003	0.000548	0.0114	-0.000181
Price Growth	(0.0408)	(0.0679)	(0.0388)	(0.0712)
Negative Real Equity	0.281***	0.245**	0.290***	0.244**
Price Growth	(0.1040)	(0.1150)	(0.0991)	(0.1100)
No. of Obs.	948	948	948	948
AUC	0.844	0.844	0.84	0.844

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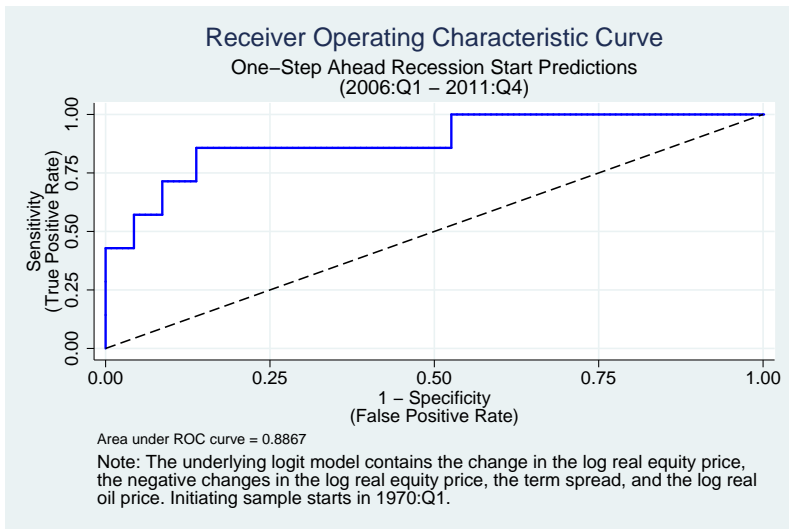
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- Baseline also robust to inclusion of additional lags (4 total).

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Severe recessions

We also looked at how the model performed in predicting severe recessions (deep in terms of output fall).

Predicting Severe Recessions in the G-7
Baseline Results, 1970:Q1-2011:Q4

Explanatory Variable	Logistic Regression Model						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Real Equity	-0.102***					-0.602***	-0.571***
Price Growth	(0.0240)					(0.1680)	(0.2030)
Term Spread		-0.714***					-0.645***
		(0.2000)					(0.2030)
Log Real			1.365***				1.653***
Oil Price			(0.3930)				(0.4970)
Real House				0.076			0.0626**
Price Growth				(0.1020)			(0.0314)
Negative Real Equity					-0.0928***	0.583***	0.516**
Price Growth					(0.0302)	(0.1740)	(0.2050)
No. of Obs.	467	467	467	467	467	467	467
AUC	0.801	0.811	0.739	0.702	0.756	0.823	0.901

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Overall performance out-of-sample

Receiver Operating Characteristic Curve
One–Step Ahead Recession Start Predictions
(2006:Q1 – 2011:Q4)

Area under ROC curve = 0.8867

Note: The underlying logit model contains the change in the log real equity price,
the negative changes in the log real equity price, the term spread, and the log real
oil price. Initiating sample starts in 1970:Q1.

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Great Recession Starts

One−Step Ahead Classifier
Baseline Model at Start of Great Recession

Note: Red line indicates optimal threshold (Youden's J−statistic) to achieve
a false positive rate < 12%.

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Preliminary results

- Predictions are generally too low to merit interpretation as probabilities.

- When viewed as a classification problem, then the model does well for France, Germany, Italy, Japan, and the United Kingdom.

- However, it performs poorly for Canada and the United States.

- More work needed to inspect country-by-country.

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Conclusion

- Focus on identifying *new* recessions with simple model centered on a few financial variables.

- Equity price growth, term spread, and oil price are significantly associated with new recessions, while house prices are not.

- Non-linearities evident in the effect of equity prices, with equity price drops showing larger effects (in absolute terms) than rises.

- Next steps . . .
  - more in-depth, out-of-sample analysis
  - country-by-country investigation $\Rightarrow$ the rare events problem can be acute in these cases, likely necessitating the use of one of the alternative estimation methods.