The lasso you know, the better

Nowcasting GSIB scores with high frequency economic and financial time series

- We have highlighted the spillovers of Fed activity and Treasury supply to bank regulatory metrics, most notably in terms of GSIB scores
- With this in mind, and leaning on our previous work at identifying the importance of key variables in determining fluctuations in GSIB score, we develop models here aimed at nowcasting them
- We make use of a range of relevant financial and economic time series, employing dimension reduction techniques, domain knowledge, and lasso regressions to select a small number of inputs and avoid overfitting
- Our models perform well in-sample, accurately capturing the upswing in aggregate scores in March of this year
- 2Q20 scores appear to have increased modestly once more for most banks, reflecting continued Fed balance sheet expansion, increased issuance, and strong derivatives market activity

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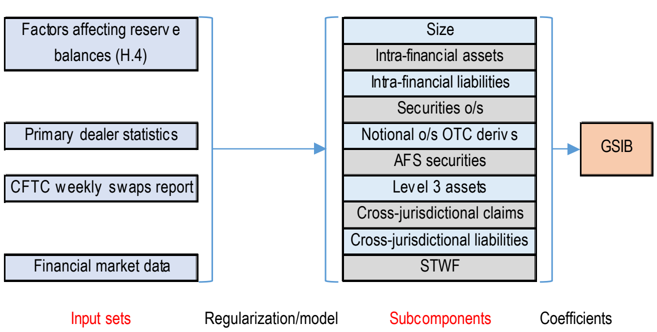
Nowcasting GSIB scores with high frequency economic and financial time series

As we've highlighted recently, numerous Fed interventions and fiscal policy measures have carried a material footprint for banks in terms of regulatory spillovers, most notably for GSIB scores (see *The inadvertent regulatory pressure of Fed interventions*, H. St John et al., 5/29/20). This was already alluded to in the first quarter, where the expansion to factors supplying reserves, alongside increasing derivatives notional outstanding and on-balance sheet securities led to substantial increases for several institutions (see *1Q20 GSIB filings point to pressure coming from almost every corner*, H. St John et al., 6/3/20). While some pressures are likely to subside as we move further from the focal point of market volatility, continued expansion of aggregate bank balance sheets, and the spillovers from higher Treasury supply are likely to continue to bias scores higher going forward.

The potential for some form of carve-out notwithstanding, **rising GSIB scores impedes the ability of bank-affiliated dealers to intermediate in funding markets around key statement dates**. We've focused in our previous research on identifying some of the most influential variables. In this note, we focus more on the practical applications of these findings, using a substantial data set, parameter reduction techniques, domain knowledge, and lasso regressions to estimate intraquarter GSIB scores, both in aggregate and for individual banks. By virtue of the higher frequency (weekly in many cases, daily in some) and nearly cotemporaneous release time for the aforementioned data, this allows us to build nowcasters for individual GSIBs. This should help us better identify where banks are likely to face higher threshold risks well in advance of the release of regulatory disclosure, which is typically 45-60 days after quarter-end.

Exhibit 1: We use a variety of economic and financial time series at a weekly frequency to map to individual GSIB subcomponents
GSIB model schematic



Source: J.P. Morgan

Exhibit 2: We find that a diverse range of variables tend to be influential in driving score forecasts across subcomponents
Most frequently appearing feature input across individual GSIB regressions by subcomponent

Feature	Subcomponent
Total Fed b/s (chg)	Size
USD swaps (o/s)	Intra-financial assets
Fed repo (chg)	Intra-financial liabilities
S&P Financials index	Securities o/s
Gross notional o/s interest rate swaps	Notional o/s OTC derivs
Foreign official holdings USTs	AFS securities
Interest rate swaps (other currencies)	Level 3 assets
JPY swaps o/s	Cross-jurisdictional claims
Fed repo (chg)	Cross-jurisdictional liabilities
<40d CP o/s	STWF

Source: J.P. Morgan, FRB, FRBNY, CFTC, Haver

Less is more…

Our model makes use of weekly data from 4 main sources: The H.4 "Factors affecting reserve balances" series from the Federal Reserve Board, the primary dealer

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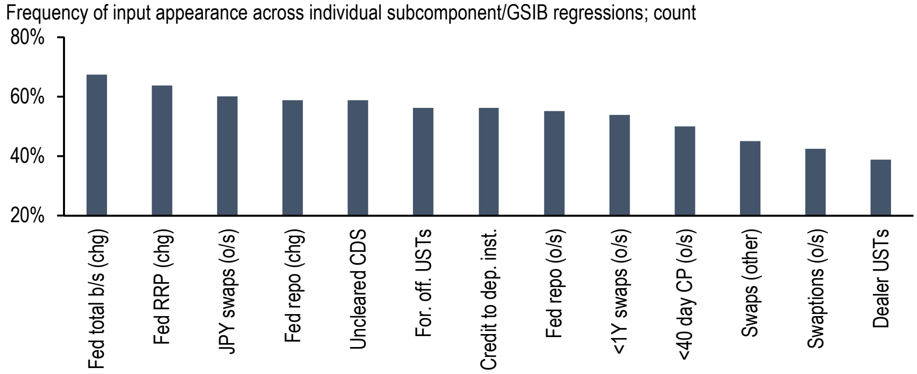
statistics from the New York Fed, the CFTC weekly swaps report, and financial markets data for certain key bond and equity indices. Our concept is relatively simple: map these individual variables to bank-level GSIB subscores, and then applying the relevant coefficients to calibrate a final estimate of those scores by bank (**Exhibit 1**). The input set at hand is rather large, with 1,647 individual variables. We take some preliminary (i.e., manual) steps to reduce this somewhat, dropping duplicative variables which are significantly correlated in terms of levels or first differences, as well as discontinued variables and variables that we view as adding little additional value to the modelling task at hand. This leaves us with a far more tractable 162 variable sample.

From here, we take our standardized input set and employ a sequence of lasso regressions to model quarterly changes in individual GSIB-level subcomponents: size, intra-financial assets, intra-financial liabilities, securities outstanding, notional outstanding of OTC derivatives, AFS securities, level-3 assets, cross-jurisdictional claims, cross-jurisdictional liabilities, and short-term wholesale funding. Lasso regression augments the standard linear regression cost function with a penalty term for the sum of absolute normalized coefficients, subject to some penalty term parameter, which in effect works to mitigate the potential bias that comes from overfitting when using many inputs, suppressing non-essential inputs to zero. For our purposes, this allows us to cast a wide net with our feature set, which had already been trimmed by hand, and let the model converge on a smaller set of parameters. We find that idiosyncratic drivers tend to matter for the individual subcomponents, with the weekly derivatives notional series proving particularly helpful through a number of avenues (**Exhibit 2**). Moreover, the aggregate Fed balance sheet proves to be the most consistent input variable across the individual models, closely followed by a number of Fed liquidity management tools, such as repo volumes outstanding and the weekly change in Fed reverse repo operations (**Exhibit 3**).

Exhibit 3: Aggregate Fed balance sheet and repo operations tend to dominate, though traded derivatives notional also proves highly influential across models

Frequency of input appearance across individual subcomponent/GSIB regressions; count



Note: Each regression for an individual GSIB subcomponent takes the entire feature set from 2014Q3—2020Q1, and employs lasso regression to minimize the sum of absolute normalized coefficients subject to alpha = 1, to minimize model overfitting.
Source: J.P. Morgan, FRB, FRBNY, CFTC, Haver

Putting it all together

We can use these reduced-parameter models to build simple nowcasts of aggregate GSIB scores, based off the available data at a weekly frequency. Since the GSIB subcomponents are already modelled in terms of their Method II point contributions, this process simply requires us to fit each respective subcomponent to the data, and sum across them. The model's in-sample fit is strong (**Exhibit 4**), with a RMSE on

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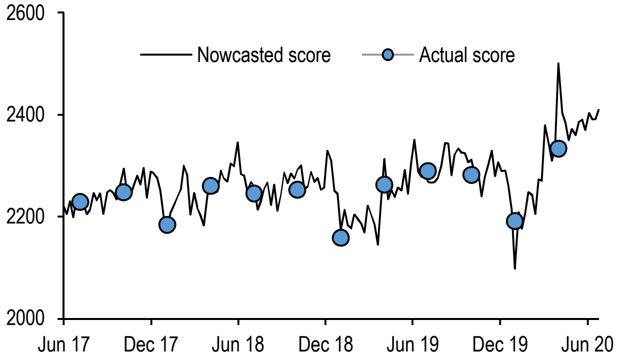
predictions 1 week prior to quarter-end averaging 3 pts across components, or 33 pts in total. Unsurprisingly, at longer forecasting horizons we find that the model accuracy tends to decline, with RMSE increasing by 72% 1-month out from quarter-end. Of course, part of the difficulty in modelling GSIB scores is that we only observe a quarter-end snapshot using mostly quarter-end variables. Even if the 1-month ahead forecasts were reasonably accurate, it would also imply a greater demand to reduce scores into quarter-end, widening the gap between the prediction and the subsequent realized score. **Most importantly, even these short horizons can be quite useful given the ~45 day delay between quarter-end itself and the release of the FR-Y9C and other filings from which official scores can be calculated**.

Exhibit 4: Broadly speaking, our nowcasting models do a good job at capturing broad directional shifts in GSIB scores…

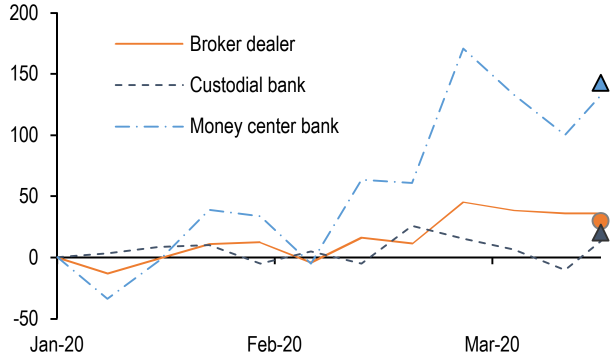
Aggregate GSIB score; actual and nowcasted for subsequent quarter; pts



Source: J.P. Morgan, FRB, FRBNY, CFTC, Haver

Exhibit 5: ... This was certainly true in 1Q20, with nowcasted levels swelling through late February and early March

Nowcasted GSIB score by type of bank and realized 1Q20 change; pts



Source: J.P. Morgan, FRB, FRBNY, CFTC, Haver

With this in mind, the utility in this tool is more in terms of getting an idea of both where pressure might be building, and from which areas the pressure is coming from. We have to look no further than 1Q20 for a test case of large volatility in individual bank GSIB scores, and we find that forecasted scores did swell from early March, particularly for the largest money center banks, coinciding with increased Fed activity, swelling primary dealer inventories, and a spike in traded notional in derivatives markets (**Exhibit 5**). Turning to 2Q20, we already see evidence of small upside pressure building, based on the observable data as of the end of June, though most banks are still some distance away from the next closest threshold (with some obvious exceptions; **Exhibit 6**). Pressure appears to be highest among the money center banks and broker-dealers, but fairly well-distributed across a number of subcomponents (**Exhibit 7**). Interestingly, level-3 assets, which tend to correlate with activity among credit derivatives, has crept higher, while we see more divergent predictions among short-term wholesale funding, as bank CP issuance has increased relative to the end of 1Q20.

While year-end is our central focus in terms of GSIB scores exerting genuine pressure on funding markets, further moves to the upside from here **underscore the case for some form of temporary regulatory relief to allow banks to more efficiently intermediate in lending markets**, less it results in a substantial pullback in liquidity provision around year-end. In that case, the framework presented here should continue to prove useful as we approach year-end, providing some sense of where banks are tracking relative to their targeted score thresholds, and therefore help to provide a sense of how activity in derivatives markets, and liquidity provision in the interdealer Treasury market, are likely to track over this period.

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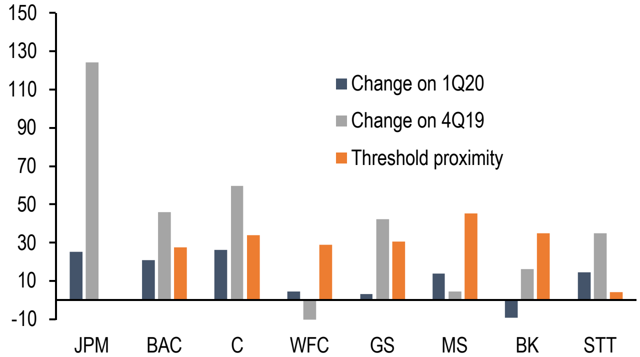
Exhibit 6: There appears to be signs that upward pressure continued to build in 1Q20…

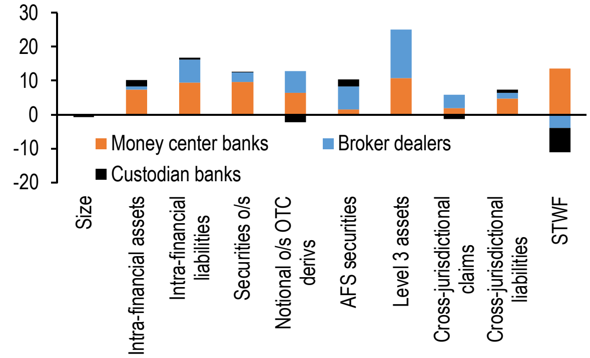
Estimated change in 2Q20 GSIB scores based off 1Q20 and 4Q19 actuals and nowcasted values, and proximity to next closest threshold (regardless of direction); pts



Source: J.P. Morgan, FRB, FRBNY, CFTC, Haver

Exhibit 7: … particularly among the largest banks, and fairly evenly distributed across the respective subcomponents

Contribution to nowcasted 2Q20 GSIB score by subcomponent; pts



Source: J.P. Morgan, FRB, FRBNY, CFTC, Haver

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