Internet Appendix to "Mutual Fund Flows and Fluctuations in Credit and Business Cycles"[1]

February 2020

This internet appendix includes two parts. In part one of the appendix we provide extensions to the main analysis conducted in the paper. In part two of the appendix we include the robustness tests reported in Section 6 of our paper, together with detailed discussions.

Part 1 – Extensions of the Main Analyses Conducted in this Paper – Table of Contents

[1] Ben-Rephael, Azi, Jaewon Choi, and Itay Goldstein, 2020, internet Appendix to "Mutual Fund Flows and Fluctuations in Credit and Business Cycles" available on SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2823162

IA.1. Regressions of Value-Weighted RFY on HY-NEIO

In this appendix we repeat the analysis conducted in Columns 4–6 of Table 2 using a value weighted version of RFY. In particular, we weight each rating category by the total amount of bonds outstanding for the rating.

	RFY q+1:q+4 - VW		
	(1)	(2)	(3)
HY-NEIO q-3:q	0.020	0.020	0.018
	(3.60)	(3.28)	(2.82)
DEP q-3:q	0.065	0.080	0.085
	(0.58)	(0.67)	(0.70)
TS q	-4.957	-4.864	-4.674
	(-2.45)	(-2.15)	(-2.03)
DS q	-12.200	-15.960	-15.793
	(-2.52)	(-2.04)	(-2.04)
TB q	-3.943	-3.936	-3.880
	(-2.55)	(-2.10)	(-2.05)
DY q	19.385	19.864	19.390
	(3.13)	(3.19)	(3.28)
HYS q-3:q		0.020	0.018
		(0.70)	(0.64)
EBP q		0.051	0.047
		(1.32)	(1.23)
HYRET q-3:q			0.002
			(0.81)
AdjRSQ	0.481	0.481	0.481

IA.2. Wald Test for Impulse Response Differences

In this appendix we report the cumulative impulse response functions of changes in real GDP growth (GDP) and changes in the unemployment rate (UR) to a one-standard-deviation shock to HY-NEIO and the EBP, together with the Wald tests for difference. For comparison between HY-NEIO and the EBP responses, the EBP shock is multiplied by -1. In Columns 1–3 we report the results for GDP, where Qtr 1–1 to Qtr 1–3 refer to the cumulative impulse response during Quarters 1–1 to Quarters 1–3, respectively. Similarly, in Columns 4–6 we report results for UR over the same quarters.

	GDP			UR		
	Qtr 1-1	Qtr 1-2	Qtr 1-3	Qtr 1-1	Qtr 1-2	Qtr 1-3
HY-NEIO Response	0.0001	0.0001	0.0012	0.0397	-0.0097	-0.0395
t-stat	(0.13)	(0.07)	(0.98)	(1.68)	(-0.27)	(-0.79)
EBP Response	0.0020	0.0036	0.0043	-0.0988	-0.1743	-0.2247
t-stat	(2.93)	(2.81)	(2.31)	(-3.64)	(-3.47)	(-3.05)
Wald Test for Difference	-0.0020	-0.0035	-0.0031	0.1385	0.1647	0.1852
P-value	(0.027)	(0.028)	(0.161)	(0.000)	(0.003)	(0.027)

IA.3. Lead-Lag Relations among Flow Components of Various Asset Classes – a Quarterly Horizon Analysis

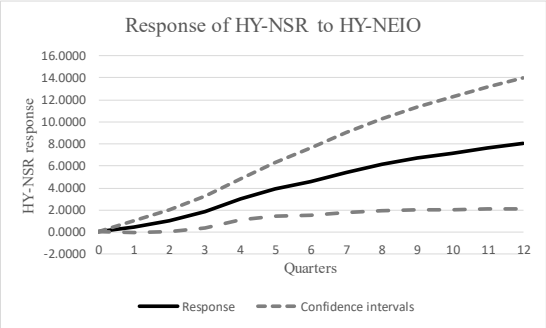
In this appendix we extend the analysis conducted in Table 8 and present the results of quarterly regressions of future NEIO and NSR flow components on their lags across various asset classes, over the next quarter. In Columns 1–4 we report the regressions of NEIO and NSR components to the high-yield (HY) and investment-grade (IG) categories on their lags and past cumulative returns on high-yield bond index returns (HYRET) and Baa-rated bond index returns (BaaRET). In Columns 5–8 we report regressions of the NEIO and NSR components on the high-yield (HY) and equity (EQ) categories, controlling for the past cumulative returns on high-yield bond index returns (HYRET) and stock market return (EXRET). In Columns 9–12 we report regressions of the NEIO and NSR components on the high-yield (HY) and government and money market mutual fund (GM) categories, controlling for past cumulative returns on high-yield bond index returns (HYRET) and the 3-month T-bill rate. The sample period ranges from February 1984 to December 2018. Standard errors are calculated using Newey-West (1987) correction, where the number of lags is based on the quarterly overlapping period. *t*-statistics are reported in parentheses below the coefficient estimates. Given the persistence of the NSR components, the coefficient estimates and standard errors are corrected using the Amihud and Hurvich (2004) correction procedure.

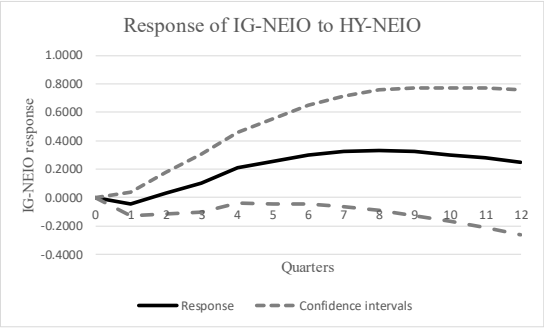
	HY&IG q +1				HY&EQ q +1				HY&GM q +1			
	HY-NEIO	HY-NSR	IG-NEIO	IG-NSR	HY-NEIO	HY-NSR	EQ-NEIO	EQ-NSR	HY-NEIO	HY-NSR	GM-NEIO	GM-NSR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
HY-NEIO q -3:q	0.190	0.611	0.054	0.392	0.112	0.423	0.053	0.192	0.168	0.513	-0.051	0.142
	(2.53)	(5.66)	(2.52)	(4.32)	(1.60)	(4.01)	(1.81)	(2.92)	(2.32)	(4.59)	(-2.12)	(0.90)
HY-NSR q -3:q	-0.032	0.082	-0.013	-0.045	-0.012	0.161	-0.010	-0.010	-0.010	0.152	0.008	-0.029
	(-1.86)	(2.56)	(-2.22)	(-1.81)	(-0.85)	(4.91)	(-1.68)	(-0.69)	(-0.88)	(4.70)	(1.75)	(-0.90)
HY-RET q -3:q	-0.023	-0.180	-0.008	-0.087	0.018	-0.035	0.001	-0.006	-0.013	-0.085	-0.001	-0.058
	(-1.34)	(-5.39)	(-1.79)	(3.53)	(1.39)	(-1.53)	(0.16)	(-0.58)	(-0.88)	(-3.35)	(-0.17)	(-1.51)
IG-NEIO q -3:q	-0.166	-0.556	0.089	-0.186								
	(-1.46)	(-2.73)	(2.42)	(-1.46)								
IG-NSR q -3:q	0.031	0.106	0.005	0.211								
	(1.31)	(2.75)	(0.78)	(5.83)								
BAA-RET q -3:q	0.020	0.195	0.017	0.176								
	(0.74)	(3.52)	(1.92)	(4.35)								
EQ-NEIO q -3:q					0.047	-0.025	0.083	-0.177				
					(0.27)	(-0.10)	(1.52)	(-1.61)				
EQ-NSR q -3:q					0.023	0.040	0.009	0.225				
					(0.84)	(0.80)	(1.20)	(5.24)				
EX-RET q -3:q					-3.044	-5.496	-0.085	1.092				
					(-3.19)	(-2.97)	(-0.26)	(1.30)				
GM-NEIO q -3:q									0.166	0.002	0.026	-0.642
									(1.08)	(0.01)	(0.54)	(-1.80)
GM-NSR q -3:q									-0.011	-0.002	0.003	0.092
									(-0.72)	(-0.05)	(0.50)	(2.16)
T-bill q									-0.440	15.304	-0.379	46.104
									(-0.07)	(1.52)	(-0.24)	(3.90)
AdjRSQ	0.045	0.565	0.231	0.665	0.119	0.545	0.144	0.684	0.041	0.520	0.084	0.247

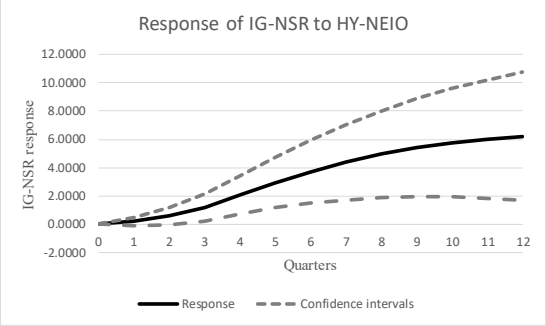
IA.4. Impulse Response of Various Flow Components to *HY-NEIO*

In this appendix we plot the impulse responses of Table 8's quarterly flow components to a one-standard-deviation (1 SD) shock to HY-NEIO. In particular, we follow the structure of Table 8 and estimate quarterly VAR (vector autoregression) systems based on the relevant flow specification with four lags of each of the dependent variables controlling for returns. Graph (a) is based on Columns 1–4 of Table 8, Graph (b) is based on Columns 5–8 of Table 8, and Graph (c) is based on columns 9–12 of Table 8. For each VAR specification, we plot the cumulative response of each of the flow components to a one-standard-deviation shock to HY-NEIO. For the sake of brevity, we do not repeat the response of HY-NSR in graphs (b) or (c). The graphs start at quarter 0 (marked as 0 on the *x*-axis) and run to 12 quarters after the shock (marked as 12 on the *x*-axis). The solid black line is the variable response, and the dashed gray lines are the 95% confidence intervals. The confidence intervals were estimated numerically using Monte Carlo simulations (see Hamilton, 1994, pp. 336–337).

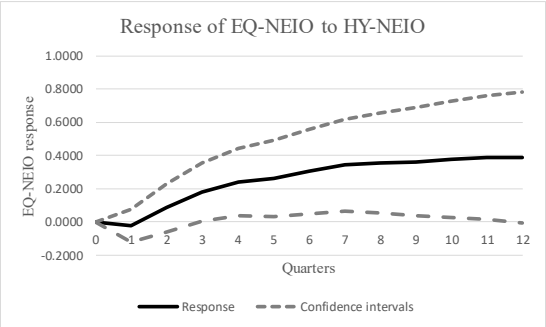
(a) Cumulative response of HY-NSR, IG-NEIO and IG-NSR to a 1 SD shock to HY-NEIO

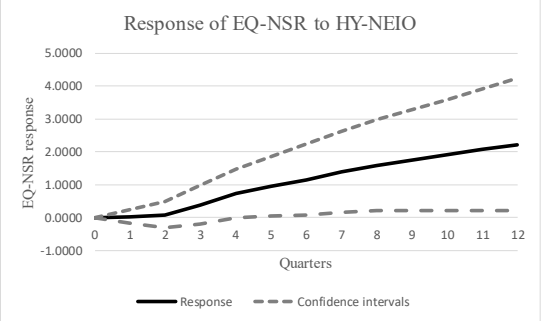




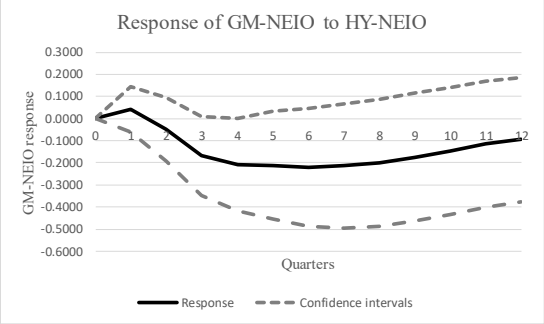


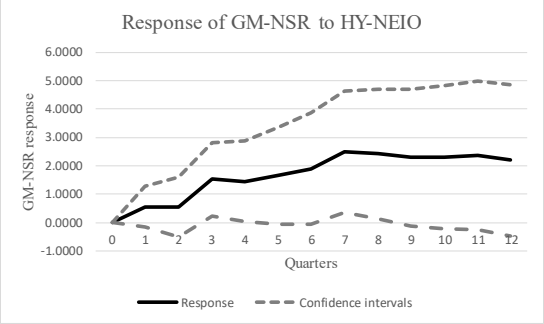
(b) Cumulative response of EQ-NEIO and EQ-NSR to a 1 SD shock in HY-NEIO





(c) Cumulative response of GM-NEIO and GM-NSR to a 1 SD shock in HY-NEIO





IA.5. HY-NEIO vs. Total Net Flows During Subsequent Period – a Quarterly Horizon Analysis

In this appendix we extend the analysis conducted in Table 11 and report the quarterly regressions of HYS (Columns 1-3), the HY-Aaa credit spread (Columns 4–6), the market excess return (Columns 7–9), the difference in log real GDP (Columns 10–12), and the difference in unemployment rates (Columns 13–15). The explanatory variables are HY-NEIO, future total net flows in the high-yield category (HY-FLOW), and future total net flows in the high-yield and equity categories (HY&EQ FLOW). *Controls* refers to full specification of each dependent variable. To evaluate the effect of future flows on HY-NEIO, for each of the dependent variables the first specification reports HY-NEIO coefficient without controlling for future flows (columns 1, 4, 7, 10, and 13). The sample period ranges from February 1984 to December 2018. Standard errors are calculated using Newey-West (1987) correction, where the number of lags is based on the monthly overlapping period. *t*-statistics are reported in parentheses below the coefficient estimates.

	HYS *q* +1			HY-Aaa *q* +1			ExRet *q* +1			GDP *q* +4			UR *q* +4		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
HY-NEIO *q* -3:*q*	0.077	0.054	0.062	-0.1578	-0.026	0.007	0.0078	0.003	-0.001	0.0008	0.0005	0.0005	-0.0314	-0.026	-0.022
	(3.75)	(2.23)	(2.33)	(-3.26)	(-0.56)	(0.15)	(2.88)	(0.81)	(-0.24)	(3.88)	(2.54)	(2.16)	(-3.52)	(-2.69)	(-2.17)
HY-FLOW *q* +1		0.028			-0.135			0.007			0.000			-0.006	
		(1.82)			(-4.55)			(3.48)			(2.26)			(-1.07)	
HY&EQ FLOW *q* +1			0.014			-0.135			0.009			0.000			-0.009
			(1.01)			(-4.40)			(4.42)			(2.33)			(-1.83)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
AdjRSQ	0.520	0.534	0.523	0.741	0.789	0.490	0.142	0.221	0.321	0.119	0.141	0.146	0.282	0.280	0.290

IA.6. Regressions of Credit and Business Cycle Variables on Predicted and Unpredicted Components of HY-NEIO – a Quarterly Horizon Analysis

In this appendix we extend the analysis conducted in Table 13 and report the results of regressing credit and business cycle variables on predicted HY-NEIO and unpredicted HY-NEIO. We use quarterly non-overlapping observations of dependent variables. We obtain the predicted component of HY-NEIO (PRED HY-NEIO) by regressing HY-NEIO $_{q\text{-}3:q}$ on the full set of economic variables defined in Table 12 and using the fitted values from the regressions as the predicted component. The unpredicted component (RESID HY-NEIO) is the residual of the regressions. *Controls* refers to full set of control variables for each of the dependent variables. Standard errors are calculated using Newey-West (1987) correction, where the number of lags is based on the number of overlapping observations. *t*-statistics are reported in parentheses below the coefficient estimates.

	HYS $q+1$	RFY $q+1$	HY-Aaa $q+1$	dA/A $q+1$	NBI $q+1$	GDP $q+4$	UR $q+4$	MktRf $q+1$	HYRET $q+1$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PRED HY-NEIO q-3:q	0.0562	0.0022	-0.1347	0.0052	0.0011	0.0004	-0.0069	0.0020	0.0614
	(1.85)	(0.52)	(-2.17)	(1.89)	(1.20)	(1.04)	(-0.58)	(0.46)	(0.23)
RESID HY-NEIO q-3:q	0.0829	0.0024	-0.1984	0.0002	0.0008	0.0011	-0.0495	0.0106	0.4886
	(3.33)	(0.68)	(-3.26)	(1.54)	(1.80)	(4.08)	(-3.67)	(2.92)	(2.16)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES

Part 2 – Robustness Tests – Results and Discussions

As discussed in Section 6 of our paper, we perform a comprehensive set of robustness checks. In this part of the appendix, we report these results together with their detailed discussion.

2.1 Statistical Inference with Overlapping Observations (IA.7)

We base our analysis in part on overlapping observations of the dependent variable. As we show, using longer-horizon dependent variables, allows us to report results that would have been masked using only non-overlapping quarterly specifications. Although we use Newey-West standard errors, it is not clear how sufficient the Newey-West standard errors are when adjusting for the dependent variable autocorrelation (e.g., Hodrick 1992).

To address this concern, in this subsection, we perform two sets of tests. First, we use non-overlapping annual regressions (see Panel A of Table IA.7). In particular, we provide four separate regression results based on the following four time horizons of annually measured variables, that is, Jan–Dec, Apr–Mar, Jul–Jun, and Oct–Sep across seven credit and business cycle variables as dependent variables. Although these regressions are affected to a greater extent by outliers, we find that the results derived from these non-overlapping observations are largely consistent with our previous results, showing the strong predictive power of HY-NEIO for future credit and business cycles.

Second, we report bootstrap-simulated standard errors that provide corrected p-values (see Panel B of Appendix IA.7). The analysis indicates that the results are still significant at the 1% and 5% levels, which alleviates concerns regarding statistical inferences using longer horizon dependent variables.

Overall, the additional tests reported in this subsection show the robustness of our

findings and alleviate statistical concerns associated with using overlapping tests.

2.2 Horserace between HY-NEIO and Flow Components in Other Asset Classes (IA.8-IA.11)

In Appendix IA.8 we run a horserace between intra family flow shifts (i.e., NEIOs) across various asset classes against one another. The results show that across all specifications HY-NEIO is statistically significant at the 5% level in predicting future economic and credit cycle variables even after controlling for the other NEIOs. In contrast, none the other NEIOs are statistically significant in any of the columns.

We run another horserace in Appendix IA.9 using NSRs into other asset classes. The results show that NSRs do not predict many of the credit cycle variables that HY-NEIO can predict. Only in Columns 7 and 8 of Panel A, HY-NSR exhibits strong predicting power for future economic cycle variables. We further examine this issue using a VAR in Appendix IA.10 to allow for past shocks in HY-NEIO to affect HY-NSR, as HY-NEIO also predicts HY-NSR (Table 8). Appendix IA.10 shows that the impulse responses of economic cycle variables to HY-NSR are neither economically nor statistically significant when the dynamic relationship between HY-NEIO and HY-NSR is considered.

Lastly, in Appendix IA.11 we report the incremental contribution of HY-NEIO to explanatory power in our predictive regressions. The results show that HY-NEIO does a better job in explaining the key dependent variables than other competing explanatory variables.

2.3 The Predictive Power of HY-NEIO in Rolling Subsamples (IA.12)

The high-yield corporate bond fund category has grown substantially over time, comprising around 250 billion dollars in assets under management in 2018. On one hand, this increase could strengthen HY-NEIO's predictive ability. On the other, an increase in popularity of the HY category could have a negative effect if it also attracts less sophisticated investors. We examine HY-NEIO's predictive ability over time using rolling window regressions of 15-year intervals. Appendix IA.12 shows that HY-NEIO's predictive ability, as measured by the coefficient estimates, has increased over time. Thus, the growth of the fund sector did not have a negative effect on the predictive ability of HY-NEIO.

In untabulated results, we verify that our results are not driven by the 2007-2008 financial crisis by rerunning our key analyses for the period 1984-2006. We find qualitatively similar results and conclude that our results are not driven by the most recent financial crisis.

Finally, in untablulated results, we employ first differences in total net flows instead of levels to examine whether changes in total flows can be informative of future credit cycles. We find that while changes in total net flows are able to predict credit cycle variables to some degree, they are not able to predict business cycle variables.

IA.7. Robustness Checks for Overlapping Estimation

In this appendix we explore the robustness of the statistical significance of our overlapping quarterly regression estimations. In Panel A, we rerun our main analysis at the annual frequency. Given the low number of annual observations, the coefficients are sensitive to outliers and the estimation is nosier. Thus, we report the regressions for all four potential quarterly cut offs: Jan-Dec, Apr-Mar, Jul-Jun and Oct-Sep and control for DS, TS, TB, and DY. In Panel B, we use Bootstrap simulations and we report the empirical and simulated p-values of HY-NEIO for the main specifications. In each column we report HY-NEIO coefficient together with the empirical and simulated p-values. For each specification, we run 1,000 bootstrap simulations under the null hypothesis of no relation between HY-NEIO and the dependent variable of interest. In each round, we randomly draw monthly HY-NEIO observations with repetition to construct HY-NEIO $_{q\text{-}3:q}$. We then replace the original HY-NEIO $_{q\text{-}3:q}$ with the simulated one, run the specification with the full set of controls and store the simulated t-statistics. We then compare the empirical t-statistics with the simulated distribution and report the simulated p-value.

Panel A: Annual Observations

	HYS-1Y	RFY-1Y	HY-Aaa-1Y	GDP-1Y	UR-1Y	DCR-2Y	MktRf1Y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HY-NEIO *q*-3:*q* - [JAN-DEC]	0.0727	0.0161	-0.2620	0.0018	-0.0830	0.2549	0.0125
	(1.63)	(2.69)	(-2.40)	(2.70)	(-3.46)	(3.50)	(1.50)
HY-NEIO *q*-3:*q* - [ARP-MAR]	0.0904	0.0191	-0.2308	0.0023	-0.1030	0.1871	0.0242
	(2.82)	(4.53)	(-2.07)	(2.09)	(-2.05)	(2.57)	(1.88)
HY-NEIO *q*-3:*q* - [JUL-JUN]	0.1004	0.0177	-0.0715	0.0027	-0.1642	0.1591	0.0171
	(5.62)	(3.19)	(-1.43)	(3.04)	(-4.54)	(1.92)	(2.13)
HY-NEIO *q*-3:*q* - [OCT-SEP]	0.0877	0.0229	-0.1369	0.0020	-0.1043	0.2219	0.0226
	(3.27)	(3.71)	(-1.73)	(2.33)	(-3.07)	(2.95)	(1.89)

Panel B: Simulated p-values

	HYS-1Y	RFY-1Y	HY-Aaa-1Y	BAA-Aaa-1Y	dA/A
	(1)	(2)	(3)	(4)	(5)
HY-NEIO *q*-3:*q*	0.112	0.017	-0.266	-0.0285	0.003
Empirical P-value	<.0001	(0.0003)	(0.0013)	(0.0175)	(0.0213)
Simulated P-Value	(0.0020)	(0.0010)	(0.0070)	(0.0220)	(0.0140)

	NBI	GDP-2Y	UR-2Y	DCR-2Y	MktRf-1Y
	(6)	(7)	(8)	(9)	(10)
HY-NEIO *q*-3:*q*	0.001	0.003	-0.137	0.186	0.017
Empirical P-value	(0.0351)	(0.0189)	(0.0035)	(0.0086)	(0.0209)
Simulated P-Value	(0.0390)	(0.0400)	(0.0040)	(0.0290)	(0.0310)

IA.8. Contrasting HY-NEIO with Other Asset Class NEIOs

In this appendix we report the results of extending our previous analyses by exploring the relationship between HY-NEIO and other asset class NEIOs. We include all flow components together in a horse race. Controls refers to full specification of each dependent variable. The sample period ranges from February 1984 to December 2018. EBP data end in September 2016. Standard errors are calculated using Newey-West (1987) correction, where the number of lags is based on the quarterly overlapping period. t-statistics are reported below the coefficient estimates.

	HYS $q+1$	RFY $q+1$	NBI $q+1$	dA/A $q+1$	HY-Aaa $q+1$	MktExRet $q+1$	GDP-1Y	UR-1Y
	(1)	(2)	(2)	(3)	(4)	(5)	(6)	(7)
HY-NEIO q-3:q	0.0826	0.0065	0.0009	0.0032	-0.1760	0.0079	0.0025	-0.0853
	(3.82)	(2.31)	(1.92)	(2.05)	(-3.52)	(2.72)	(3.48)	(-3.59)
EQ-NEIO q-3:q	-0.1374	0.0083	0.0004	-0.0077	-0.3218	-0.0020	-0.0011	0.0707
	(-1.72)	(0.80)	(0.22)	(-0.90)	(-2.62)	(-0.21)	(-0.53)	(0.72)
IG-NEIO q-3:q	-0.0659	0.0195	-0.0006	-0.0079	0.1103	-0.0144	-0.0032	0.1316
	(-1.48)	(2.14)	(-0.66)	(-2.27)	(1.31)	(-2.49)	(-1.44)	(1.19)
GM-NEIO q-3:q	-0.0558	0.0155	-0.0019	-0.0120	-0.3130	-0.0023	-0.0001	0.0862
	(-0.59)	(1.12)	(-0.88)	(-1.52)	(-1.92)	(-0.16)	(-0.02)	(0.52)
Controls	YES	YES	YES	YES	YES	YES	YES	YES

IA.9. Contrasting HY-NEIO with HY-NSR and Other Asset Class NSRs

In this appendix we report the results of extending our previous analyses by exploring the relationship between HY-NEIO and HY-NSR (Panel A) and HY-NEIO and other asset class NSRs (Panel B). We include all flow components together in a horse race. Controls refers to full specification of each dependent variable. The sample period ranges from February 1984 to December 2018. EBP data end in September 2016. Standard errors are calculated using Newey-West (1987) correction, where the number of lags is based on the quarterly overlapping period. *t*-statistics are reported below the coefficient estimates. Given the persistence of the NSR components, the coefficient estimates and standard errors are corrected using the Amihud and Hurvich (2004) correction procedure.

Panel A: Contrasting HY-NEIO with HY-NSR

	HYS $q+1$	RFY $q+1$	NBI $q+1$	dA/A $q+1$	HY-Aaa $q+1$	MktExRet $q+1$	GDP-1Y	UR-1Y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HY-NEIO q-3:q	0.0679	0.0055	0.0011	0.0034	-0.1318	0.0060	0.0021	-0.0497
	(2.76)	(1.58)	(1.97)	(2.02)	(-2.73)	(2.14)	(2.49)	(-1.71)
HY-NSR q-3:q	0.0060	0.0011	0.0000	0.0000	-0.0157	0.0010	0.0004	-0.0304
	(1.07)	(0.75)	(-0.22)	(-0.01)	(-1.71)	(1.14)	(2.28)	(-3.57)
Controls	YES	YES	YES	YES	YES	YES	YES	YES

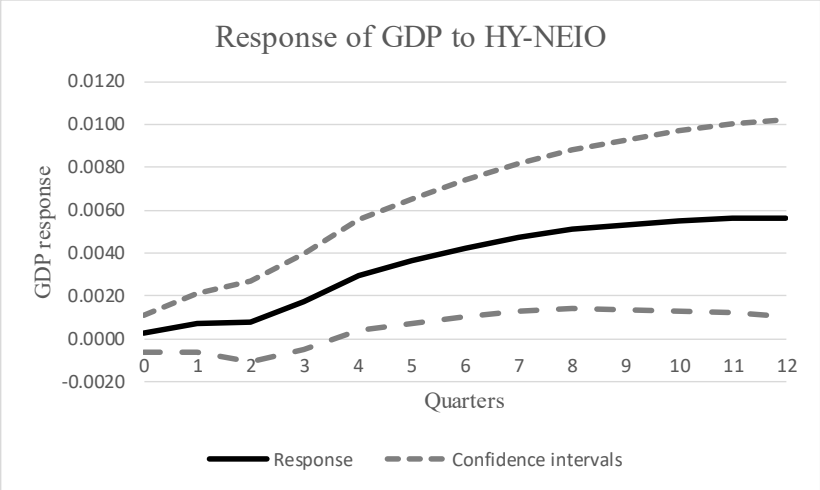
Panel B: Contrasting HY-NEIO with other Asset Class NSRs

	HYS $q+1$	RFY $q+1$	NBI $q+1$	dA/A $q+1$	HY-Aaa $q+1$	MktExRet $q+1$	GDP-1Y	UR-1Y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HY-NEIO q-3:q	0.0753	0.0054	0.0010	0.0039	-0.1707	0.0092	0.0024	-0.0978
	(3.55)	(1.93)	(1.89)	(2.19)	(-3.52)	(3.40)	(2.77)	(-2.85)
EQ-NSR q-3:q	0.0063	0.0001	0.0001	-0.0008	-0.0762	0.0011	0.0010	-0.0263
	(0.37)	(0.06)	(0.31)	(-0.44)	(-2.91)	(0.49)	(1.39)	(-1.03)
IG-NSR q-3:q	-0.0132	0.0021	0.0000	0.0001	0.0172	-0.0008	-0.0006	-0.0045
	(-1.70)	(1.40)	(0.10)	(0.15)	(1.24)	(-0.67)	(-1.82)	(-0.33)
GM-NSR q-3:q	-0.0011	0.0006	0.0000	-0.0005	0.0210	-0.0007	-0.0004	0.0249
	(-0.16)	(0.59)	(-0.06)	(-0.71)	(1.47)	(-0.70)	(-0.87)	(1.07)
Controls	YES	YES	YES	YES	YES	YES	YES	YES

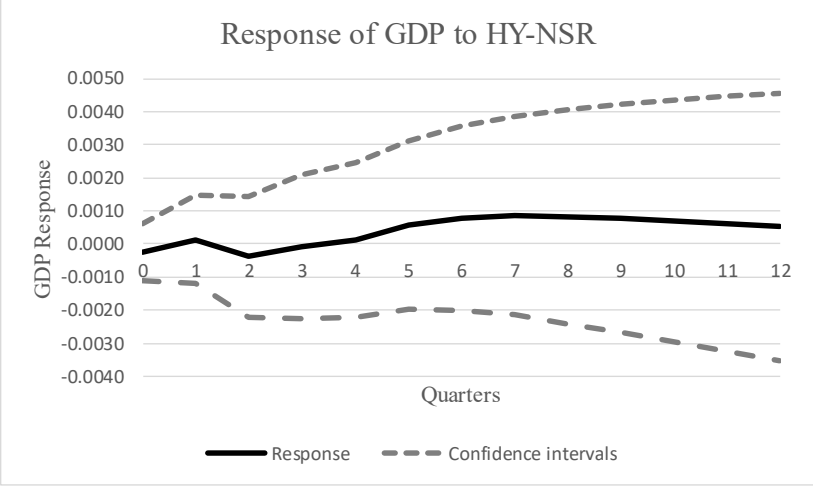
IA.10. Contrasting HY-NEIO with HY-NSR - Impulse Response of Real GDP and Unemployment Rate Changes

In this appendix we plot the cumulative impulse responses of quarterly changes in real GDP growth (GDP) and quarterly changes in the unemployment rate (UR) to a one-standard-deviation (1 SD) shock in HY-NEIO and HY-NSR. In panel A we augment Figure 5's VAR analysis with HY-NSR as an additional independent variable. Thus, we estimate a quarterly VAR system of GDP, HY-NEIO, HY-NSR, and EBP with four lags of each of the dependent variables. In panel B, we augment Figure 6's analysis and replace GDP with UR. To account for the fact that HY-NEIO leads HY-NSR (Table 8) and EBP (Table 3.B), we set the contemporaneous Cholesky shock order to HY-NEIO, HY-NSR, EBP, and GDP (UR). In graphs a and b (c and d) we plot the cumulative impulse response of GDP (UR) to a one-standard-deviation shock to HY-NEIO and HY-NSR, respectively. The graphs start at quarter 0 (marked as 0 on the *x*-axis) and run to 12 quarters after the shock (marked as 12 on the *x*-axis). The blue line is the variable response and the red lines are the 95% confidence intervals. The confidence intervals were estimated numerically using Monte Carlo simulations (see Hamilton, 1994, pp. 336–337).

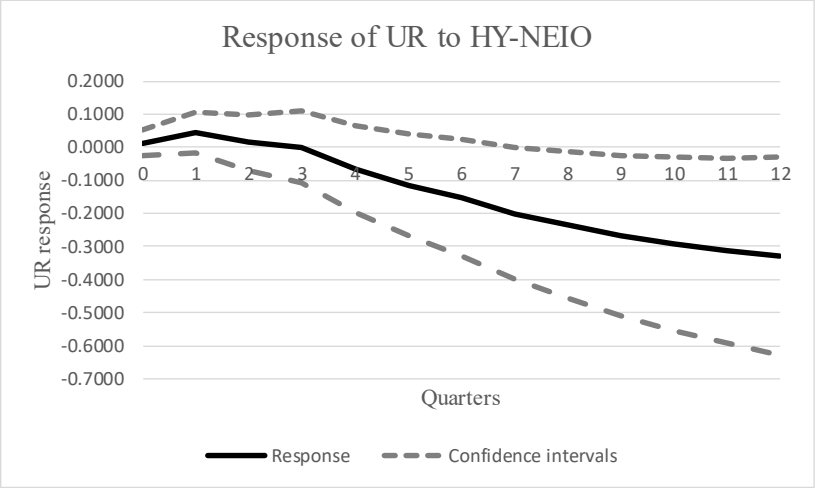
(a) Cumulative Response of GDP to 1 SD Shock in HY-NEIO



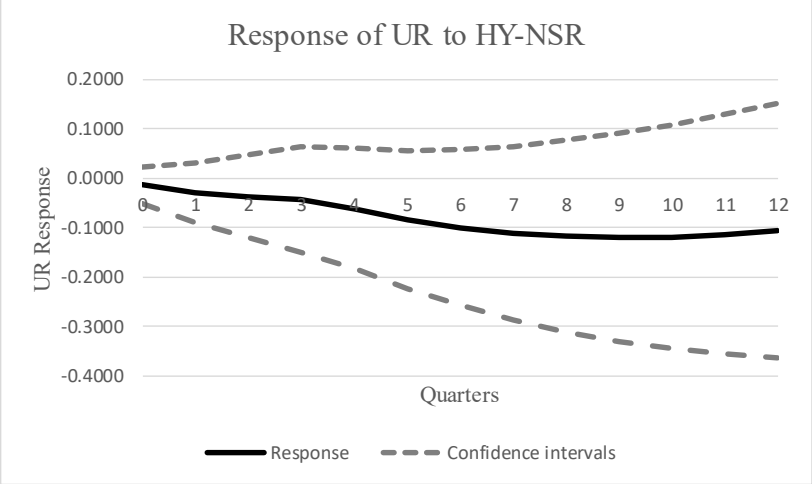
(b) Cumulative Response of GDP to 1 SD Shock in HY-NSR



(c) Cumulative Response of UR to 1 SD Shock in HY-NEIO



(d) Cumulative Response of UR to 1 SD Shock in HY-NSR



IA.11. Analyses of Incremental R^2

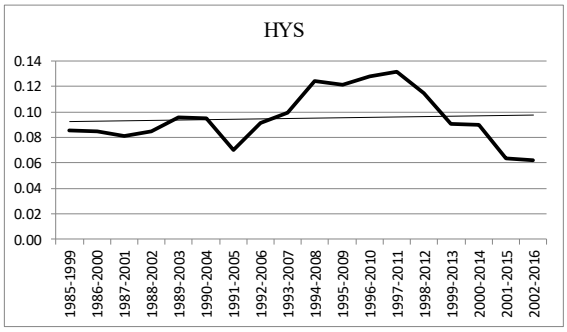
In this appendix we report the results of the incremental contribution of HY-NEIO and other variables in explaining the in-sample variation in the dependent variable. Specifically, we repeat the main analyses conducted in this paper, where we vary the order the explanatory variables and measure their contribution to the Adjusted R-Squared (Adj-RSQ). In Panel A we report Adj-RSQs from univariate regressions, where we regress the dependent variables on the lagged dependent (DEP q-3$:q$), HY-NEIO q-3$:q$, HYS $q:$3-q, and EBP q. In Panel B, we use multivariate regressions and report the contribution of HY-NEIO q-3$:q$ relative to the DS q, TS q, TB q, and DY q control variables.

	Adjusted-RSQ									
	HYS	RFY	NBI	dA/A	HY-Aaa	MktExRet	GDP 1Y	GDP 2Y	UR 1Y	UR 2Y
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A - Univariate										
DEP	0.288	0.001	0.398	0.061	0.125	0.001	0.127	0.094	0.163	0.041
HY-NEIO	0.232	0.152	0.036	0.026	0.156	0.074	0.176	0.132	0.147	0.192
HYS	N/A	0.000	0.027	0.015	0.062	0.019	0.009	0.002	0.170	0.087
EBP	0.113	0.010	0.037	0.034	0.126	0.009	0.157	0.047	0.343	0.110
Panel B - Multivariate										
DEP,TB, TS, DS, DY	0.476	0.399	0.439	0.122	0.247	0.116	0.205	0.253	0.360	0.388
DEP, HY-NEIO	0.452	0.133	0.415	0.082	0.204	0.077	0.295	0.212	0.386	0.274
DEP, TB, TS, DS, DY, HY-NEIO	0.598	0.587	0.450	0.158	0.293	0.175	0.326	0.306	0.484	0.502

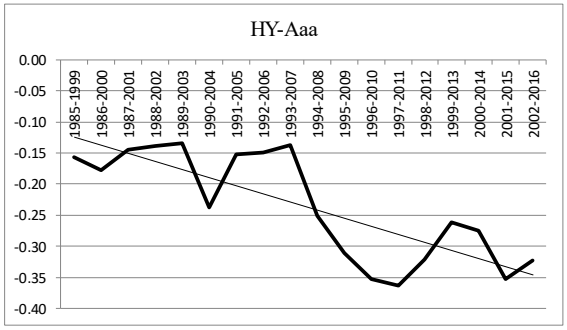
IA.12. Subsample Analysis - Trends in HY-NEIO Regression Coefficients

In this appendix we plot regression coefficients from 15-year rolling windows for HYS, HY-Aaa, changes in one-year GDP growth, and changes in one-year unemployment rate (UR). The plots are based on the regression specification, which includes HY-NEIO, the lag of the dependent variable, TS, DS, TB, and DY.

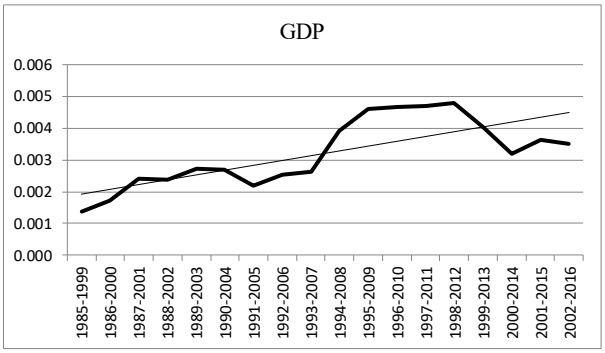
(a) HYS



(b) HY-Aaa



(c) GDP



(d) UR