Online Appendix
Impacts of monetary policy shocks on inflation and output in New Zealand

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Figure 1 plots the estimated Nelson-Siegel factors using three samples: (i) Sample 1: from 5/1/1999 to 31/12/2021 (3-month and 6-month yields are not included); (ii) Sample 2: from 14/10/2010 to 31/12/2021 (6-month yields are not included); (iii) Sample 3: from 3/1/2012 to 31/12/2021. It can be seen that the differences in the estimated factors using three samples are negligible. In the paper, we report the results of Sample 3.

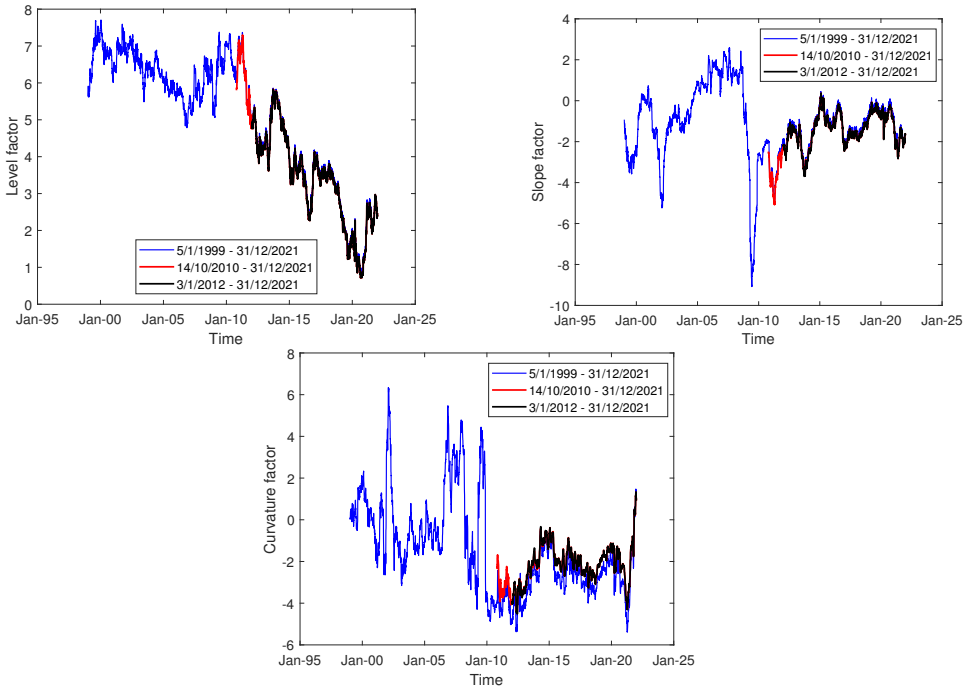


Figure 1: Estimated three NS factors using different samples.

Refinitiv reported some negative zero-coupon yields (particularly the 3-year and 4-year yields on several days in 2020). To check if these negative

yields significantly affect the estimators, we change all negative yields into zero and reestimated the Nelson-Siegel model. Figure 2 plots the estimated Nelson-Siegel factors using zero-coupon yields from Refinitiv (the red lines), and using nonnegative yields (the blue lines). The sample period is from 3/1/2012 to 31/12/2021. It can be seen that the differences in the three estimated factors are unnoticeable.

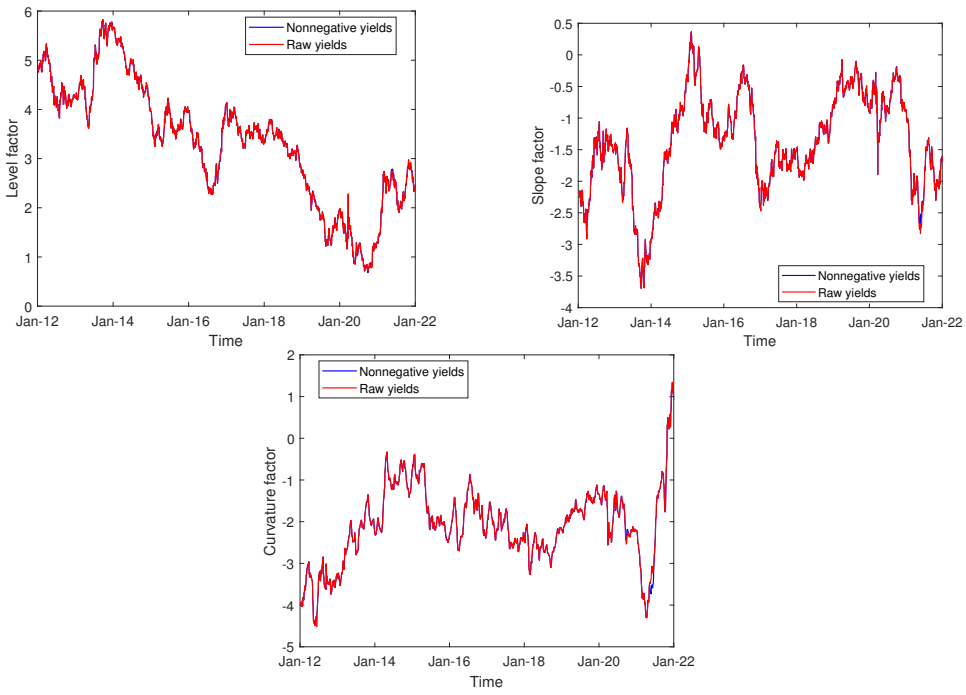


Figure 2: Estimated three NS factors using raw yields and nonnegative yields.

Table 1 reports R-squared of the estimates for the yield curves using different samples. It can be seen that the Nelson-Siegel model fits the data on zero-coupon yields in New Zealand very well.

Table 2 reports the correlations of $\Delta\beta_{1,t}^d$, $\Delta\beta_{2,t}^d$ and $\Delta\beta_{3,t}^d$ using different samples. We use Sample 4 for Section 3, which implies a high correlation of $\Delta\beta_{1,t}^d$ and $\Delta\beta_{2,t}^d$. We therefore drop $\Delta\beta_{1,t}^d$ in the estimation of impulse response functions.

Figure 3 and 4 plot responses of inflation and output to monetary policy shocks using two samples: the benchmark sample (from 03/01/2012 to 31/12/2019) and the pandemic sample (from 03/01/2012 to 31/12/2021). As the last two years of the pandemic sample experienced significant fluctuations in the estimated Nelson-Siegel factors as well as inflation, the estimated impulse responses of inflation and output using this sample might be misleading.

R-squared	Sample 1: 5/1/1999 - 31/12/2021	Sample 2: 5/1/1999 - 31/12/2019	Sample 3: 3/1/2012 - 31/12/2021	Sample 4: 3/1/2012 - 31/12/2019
3-month	-	-	0.9974	0.9948
6-month	-	-	0.9988	0.9970
1-year	0.9997	0.9997	0.9966	0.9935
2-year	0.9991	0.9989	0.9976	0.9958
3-year	0.9995	0.9994	0.9998	0.9997
4-year	0.9995	0.9993	0.9989	0.9982
5-year	0.9995	0.9994	0.9977	0.9963
6-year	0.9989	0.9985	0.9979	0.9968
7-year	0.9997	0.9996	0.9991	0.9987
8-year	0.9997	0.9996	0.9999	0.9999
9-year	0.9996	0.9994	0.9991	0.9986
10-year	0.9993	0.9992	0.9957	0.9936

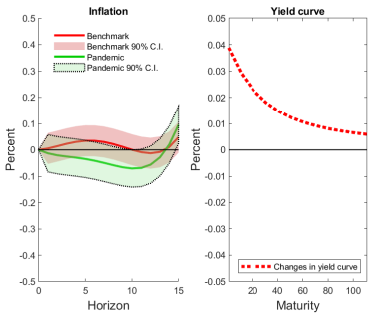
Table 1: R-squared of the estimates for the yield curves using different samples.

Correlations	Sample 1: 5/1/1999 - 31/12/2021	Sample 2: 5/1/1999 - 31/12/2019	Sample 3: 3/1/2012 - 31/12/2021	Sample 4: 3/1/2012 - 31/12/2019
$\Delta\beta^d_{1,t}, \Delta\beta^d_{2,t}$	-0.5211	-0.5423	-0.9122	-0.8823
$\Delta\beta^d_{1,t}, \Delta\beta^d_{3,t}$	-0.1755	-0.1154	0.2564	0.0619
$\Delta\beta^d_{2,t}, \Delta\beta^d_{3,t}$	0.0380	0.1054	-0.1417	0.0609

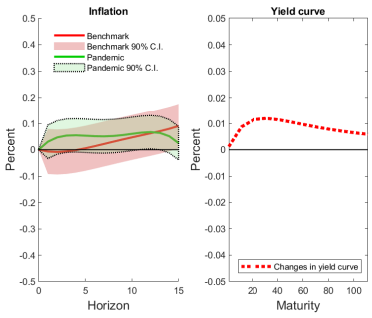
Table 2: Correlation of $\Delta\beta^d_{1,t}$, $\Delta\beta^d_{2,t}$ and $\Delta\beta^d_{3,t}$.

Figure 5 and 6 plot responses of inflation and output to monetary policy shocks using different model specifications. The red lines are results using the benchmark model (as reported in Section 3). The green lines are estimated impulse response functions when controlling for exchange rates. It can be seen that the estimated impulse responses of inflation and output are almost similar.

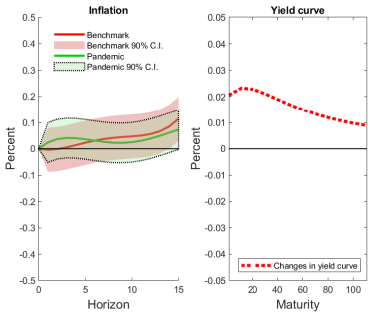
Figure 7 and 8 plot responses of inflation and output to monetary policy shocks using quarterly data from 01/1999 to 12/2019. We collect data on quarterly CPI (change Y/Y) and quarterly GDP (change Y/Y) from StatsNZ. The covering period is from Jannuary 1999 to December 2019. For monetary policy shocks, we use our estimated factors from 1/1999 to 12/2019 to measure the shocks at a daily frequency, and then attribute them to a quarterly frequency. Note that the sample of zero-coupon yields used to estimate the three factors from 1/1999 to 12/2019 only includes 1-year to 10-year yields. Data on 3-month and 6-month zero coupon yields are not



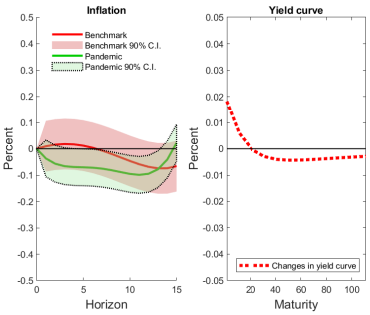
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.



(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.



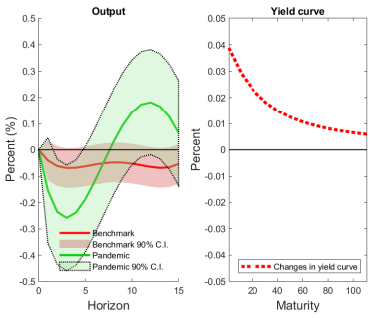
(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

Figure 3: Responses of inflation to monetary policy shocks - With and without pandemic period.

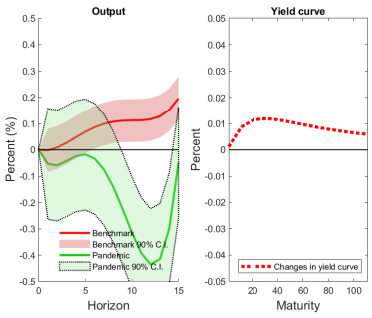
available before 2012. It can be seen that the quarterly results broadly agree with the monthly results reported in Section 3.

Figure 9 and 10 plot responses of inflation and output to monetary policy shocks using different values of λ. The red lines are results using $\lambda = 0.0609$ as reported in Section 3. By changing λ to be 30% higher (the high λ) or 25% lower (the low λ), we report the estimated impulse responses of inflation and output in these cases. The green lines are results using the high λ, and the black lines are results using the low λ. It can be seen that different values of lambda have small effect on the estimated Nelson-Siegel factors and hence the estimated yield curve. As a result, the estimated impulse responses exprerience small changes, especially the impulse responses of inflation.

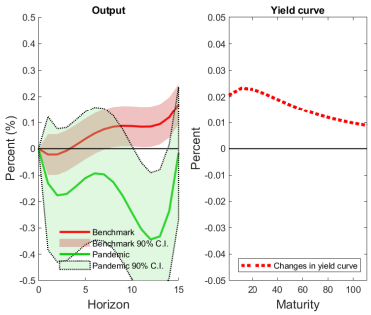
Figure 11 plots responses of inflation and output to the scalar monetary policy shock measured using fitted yields and actual yields. To produce this Figure, we measure the scalar monetary policy shock as one-day changes in actual three-month yields around monetary policy announcements (shock B). In Section 4, we measure the scalar monetary policy shock by using fitted three-month yields instead (shock A). We then estimate the impulse responses of inflation and output to these scalar monetary policy shocks. In each subfigure, the green is the estimated impulse response to shock A, the



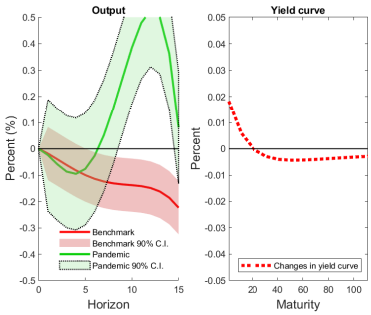
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.



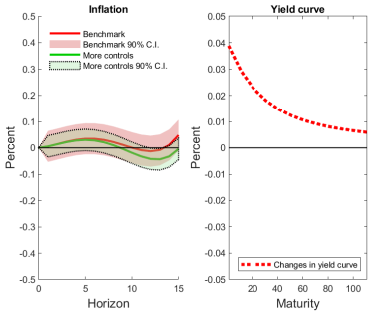
(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.



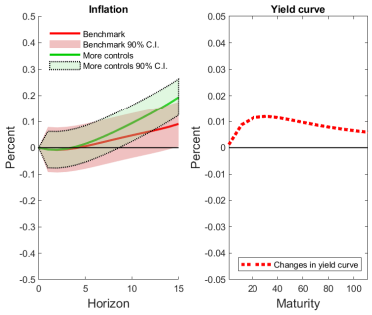
(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

Figure 4: Responses of output to monetary policy shocks - With and without pandemic period.

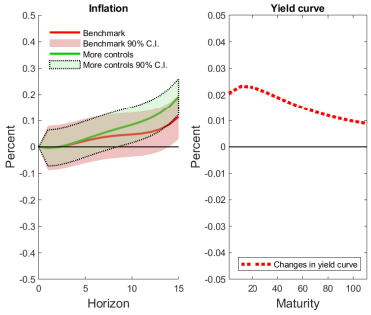
black line is the estimated impulse response to shock B. The differences in estimated impulse response functions are very small.



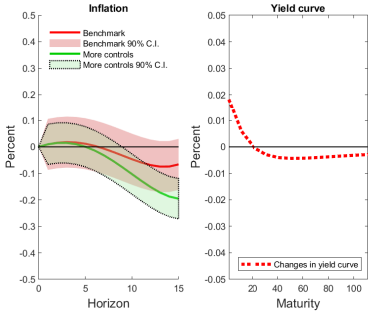
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

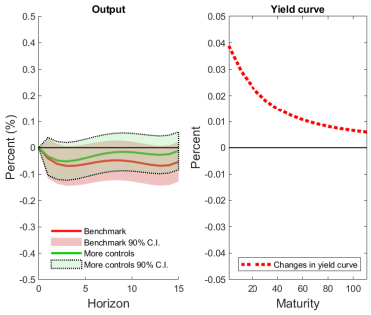


(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

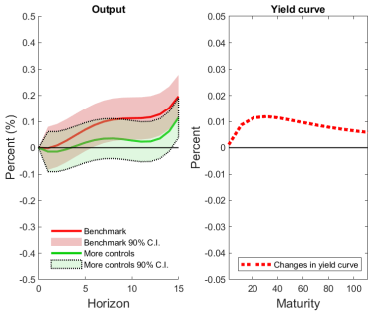


(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

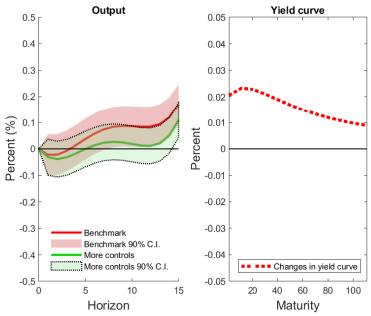
Figure 5: Responses of inflation to monetary policy shocks - With and without controlling for exchange rates.



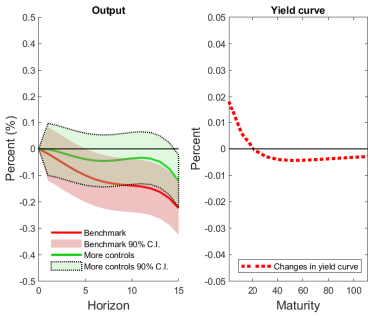
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

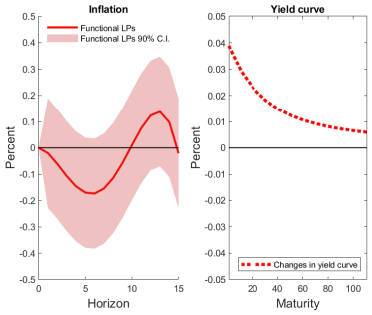


(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

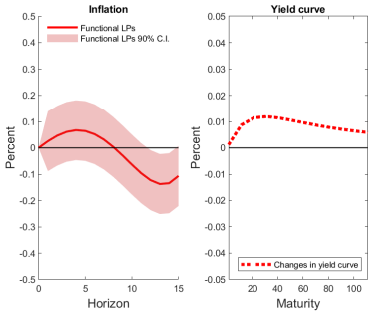


(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

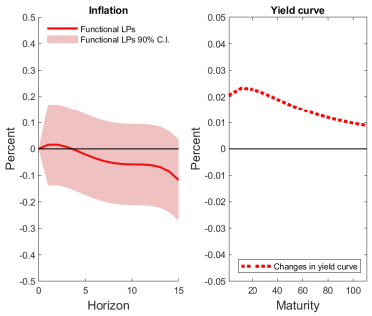
Figure 6: Responses of output to monetary policy shocks - With and without controlling for exchange rates.



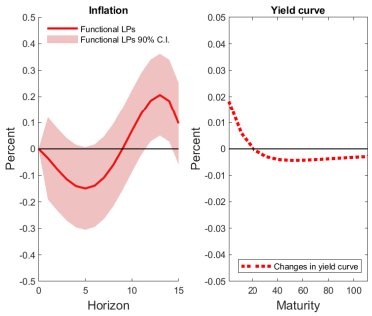
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

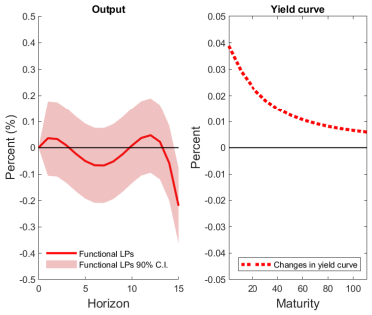


(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

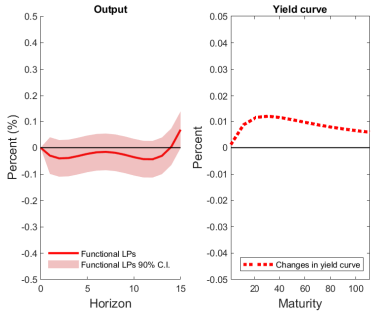


(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

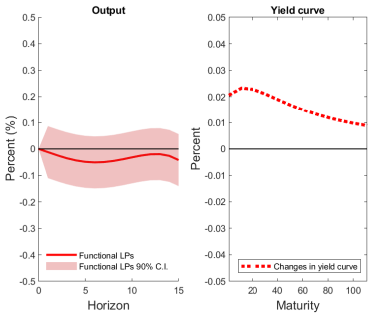
Figure 7: Responses of inflation to monetary policy shocks using quarterly data.



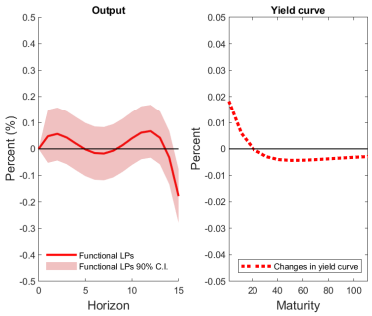
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

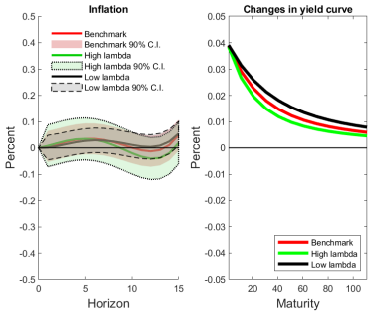


(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

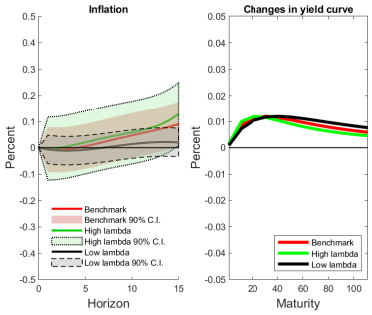


(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

Figure 8: Responses of output to monetary policy shocks using quarterly data.



(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



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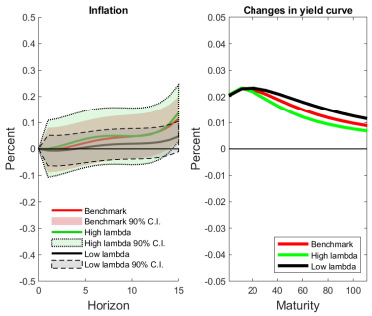

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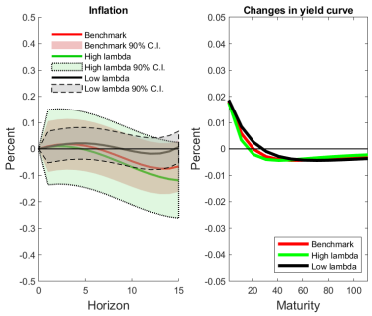
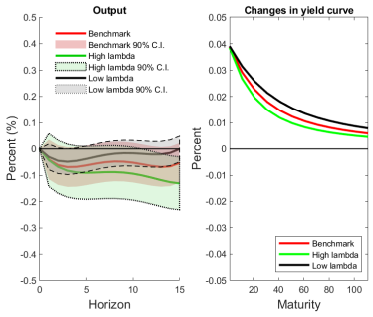
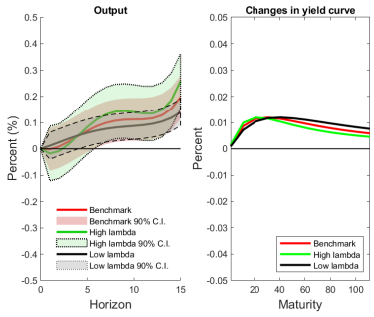


(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

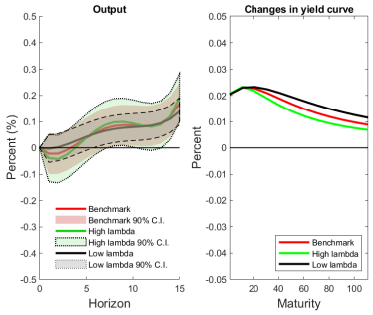
Figure 9: Responses of inflation to monetary policy shocks using different values of lambda.



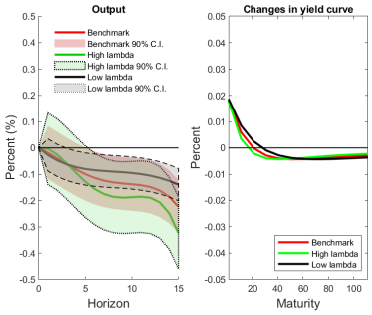
(a) $\Delta\beta^{\tau}_{2,t} = 0.04$; $\Delta\beta^{\tau}_{3,t} = 0$.



(b) $\Delta\beta^{\tau}_{2,t} = 0$; $\Delta\beta^{\tau}_{3,t} = 0.04$.

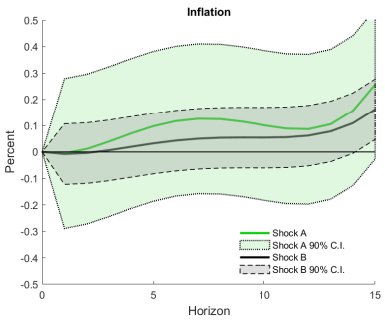


(c) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = 0.04$.



(d) $\Delta\beta^{\tau}_{2,t} = 0.02$; $\Delta\beta^{\tau}_{3,t} = -0.04$.

Figure 10: Responses of output to monetary policy shocks using different values of lambda.



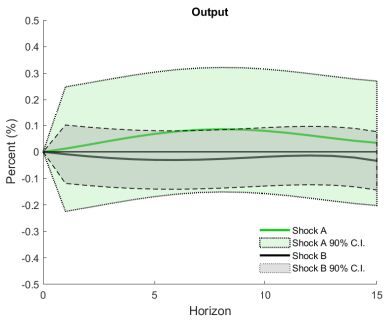


Figure 11: Responses of inflation and output to 1-std scalar monetary policy shocks measured using fitted yields (shock A) and actual yields (shock B).