Table S1. Different plasmids were injected into mice by water pressure to detect different gene expressions.

Vector	Mouse number	aPTT (sec)	PT (sec)	PT Mean+SD
PBS	F8-1	79.5	-	-
	F8-2	79.6	-	
	F8-3	82.4	-	
	F8-4	82.2	-	
129wt	JH7	48.8	-	-
	JI7	51.4	-	
	WT	47	-	
CB-FXa	JR6	69.5	12.2	12.9±1.05
	JR7	74.1	13.8	
	JR8	68.5	13.8	
	JR9	69.6	11.8	
CB-FXaRKR	JS1	76.6	14.2	14.53±0.58
	JS3	77.9	14.2	
	JS4	75.8	15.2	
CB-FXaop	JQ7	75	11.8	12.33±0.55
	JQ8	83	12.9	
	JQ9	71	12.3	
CB-FXa-FVII	JP5	71.3	13.8	12.93±0.98
	JP6	74.3	11.8	
	JP7	73.3	13.7	
	JP8	64.5	12.4	
CB-FXaRKR-FVII	JP1	74.5	13.8	14.65±0.79
	JP2	62.8	15.7	
	JP3	70.7	14.4	
	JP4	72.1	14.7	

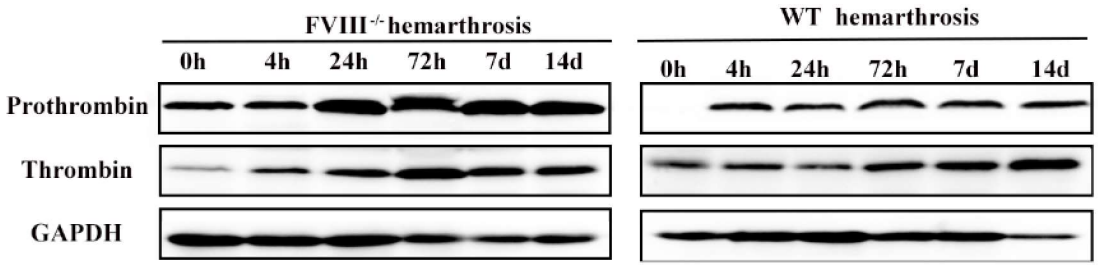

Figure S1. Distinct changes in prothrombin and thrombin expression in joint bleeding in WT and hemophilic B mice. Hemarthrosis was induced in FIX KO mice and WT mice. 0-hour-to-14-day post-joint bleeding, joints were collected for preparation of tissue homogenates. Prothrombin and thrombin in tissue homogenization were detected by western blot. GAPDH was used as a loading control.

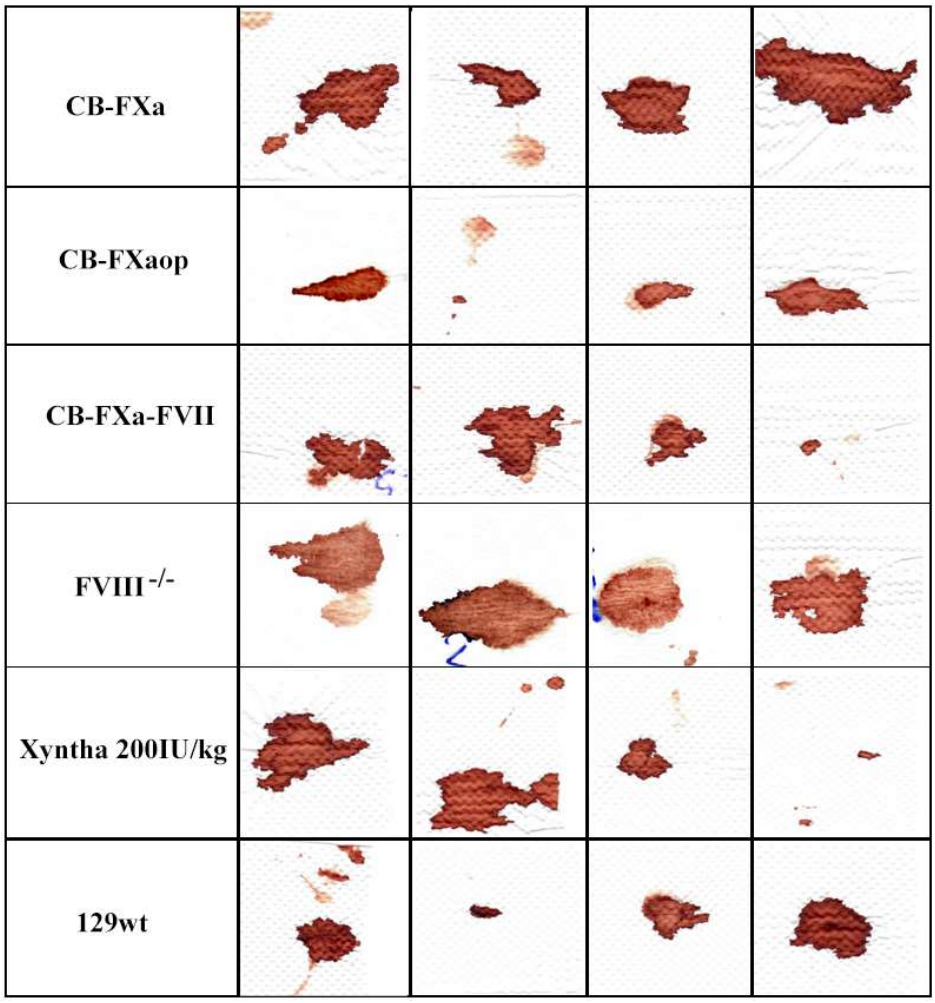

Figure S2. Assessment of bleeding area in tail transection experiment in mice. After the mice bled for 10 minutes in the tail transection experiment, firm pressure was

immediately applied to the bleeding tail for 5 minutes to staunch bleeding and promote clot formation. The animals were then returned to cages lined with white paper, and re-bleeding was observed within half an hour. The results showed the bleeding area on the paper.

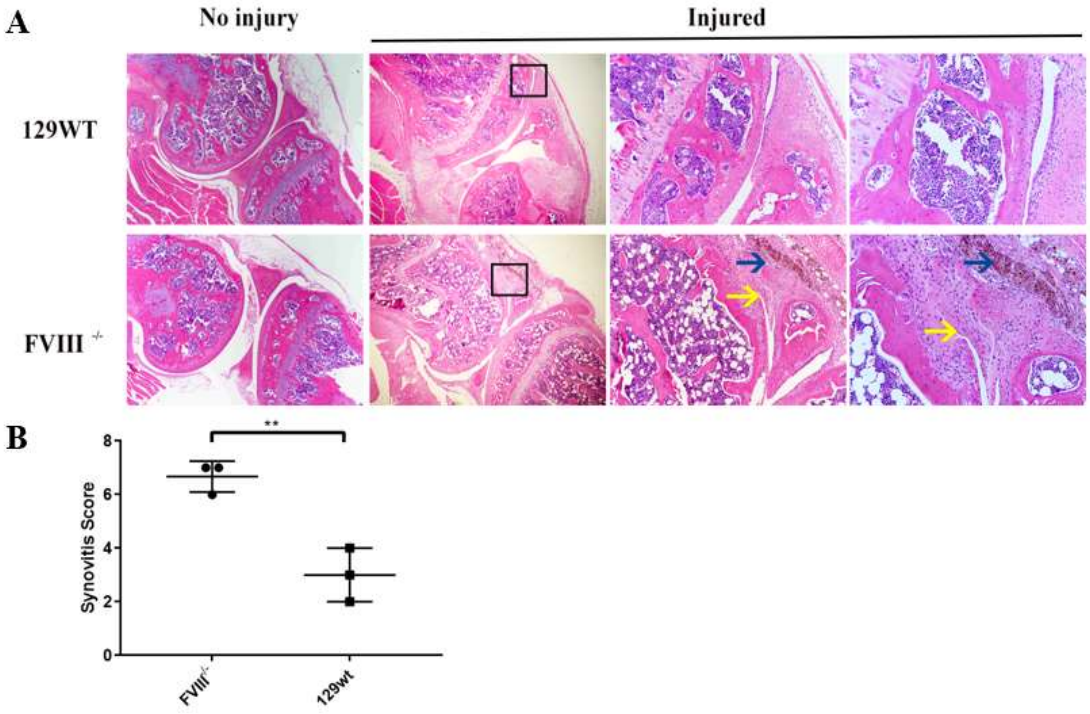

Figure S3. Verification of the FVIII$^{-/-}$ deficient mice arthritis model. Effect of FXa on delaying the development of hemophilia arthropathy in FVIII$^{-/-}$mice. (A,B) Arthritis modeling was performed on 129wt mice and FVIII$^{-/-}$ mice induced bleeding by acupuncture, and the synovitis score of the corresponding synovitis grading system in mice.