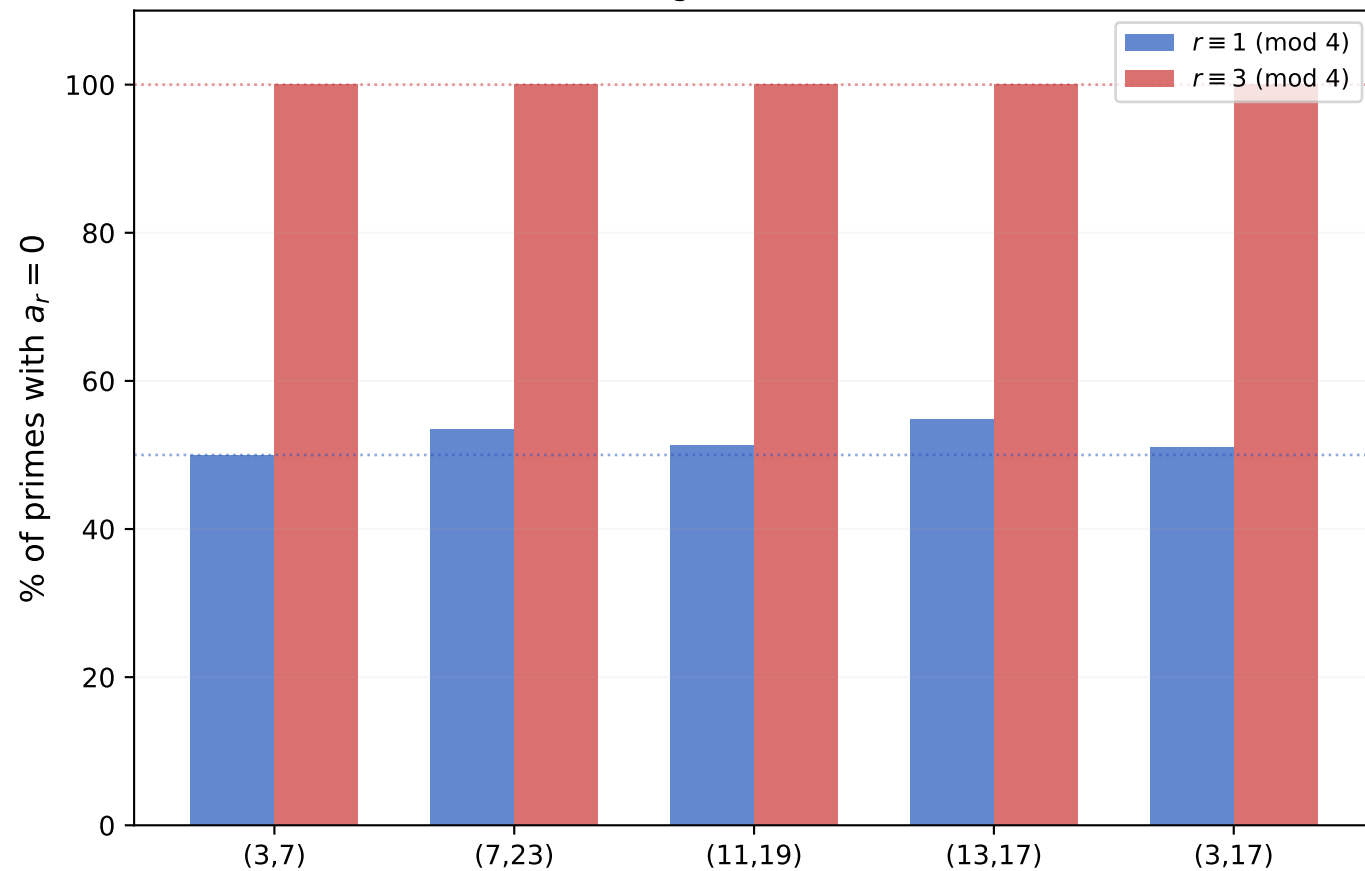


(a) Vanishing rate across 5 curves



(b) Complete local arithmetic at all primes

Local $L$ -factor classification			
Case	Condition	Reduction	Local factor
I / II	$r = p$ or $q$	1 cusp ( $A_2$ )	$(1 - a_e r^{-s} + r^{1-2s})^{-1}$
III / IV	$r \mid N$ or $r \mid (p-q)$	2 nodes ( $A_1$ )	$(1 - r^{-s})^{-2}$
Good, $r \equiv 3(4)$	$r \nmid \Delta$	Smooth	$a_1 = 0$ (proved)
Good, $r \equiv 1(4)$	$r \nmid \Delta$	Smooth	$a_1$ generic