

Ch. 2 (2.2): Banzhaf Power

①

Our motivating example will be the U.S. Senate

Currently, there are 52 Republican senators

46 Democrat senators

& 2 Independent senators

for a total of 100 senators.

A simple majority of 51 is required to pass a bill (motion).

The players: $P_1 =$ republicans

$P_2 =$ democrats

$P_3 =$ independents

The weights: $w_1 = 52$

$w_2 = 46$

$w_3 = 2$

} total $V = 100$

The quota: $g = 51.$

② Suppose there is a bill being voted on.
Each party votes "YES" or "NO".

(We assume for simplicity that everyone in the same political party votes the same way.)

Possibilities:

<u>"YES"</u>	<u>"NO"</u>	<u>OUTCOME</u>
$\{P_1\}$	$\{P_2, P_3\}$	YES
$\{P_2\}$	$\{P_1, P_3\}$	NO
$\{P_3\}$	$\{P_1, P_2\}$	NO
$\{P_1, P_2\}$	$\{P_3\}$	YES
$\{P_1, P_3\}$	$\{P_2\}$	YES
$\{P_2, P_3\}$	$\{P_1\}$	NO
$\{P_1, P_2, P_3\}$	$\{\}$	YES
$\{\}$	$\{P_1, P_2, P_3\}$	NO

We see that P_1 (the republicans) are a "dictator," using our terminology from earlier.

Note that the notation for this weighted voting system is: $[51 : 52, 46, 2]$.