TABLE S1
The matrix used for the pre-calculation of the $\omega$-statistic.

| # SNP | $i-1$ | $i$ | $i+1$ |
|---|---|---|---|
| ... | | | |
| $i-1$ | - | $Z_{i-1,i}$ | $Z_{i-1,i}+Z_{i,i+1}$ |
| $i$ | - | - | $Z_{i,i+1}$ |
| $i+1$ | - | - | - |
| ... | | | |

TABLE S1.– A cell $Z_{i,j}$, $i < j$ represents the sum of all pairwise linkage disequilibrium comparisons ($r^2$) for the sites that belong to the window $[i, j]$. We have implemented a recursive algorithm in order to calculate this matrix. In detail, the calculation starts from the cell $Z_{i,i+1}$, *i.e.* the cells next to the main diagonal and proceeds upwards to the cell $Z_{i-1,i+1}$. Then $Z_{i-1,i+1} = Z_{i-1,i} + Z_{i,i+1}$. $Z_{i,i+1} = r^2_{i,i+1}$ and $Z_{i-1,i+1}$ has been calculated in the previous cycle. Then, using this matrix it is trivial to calculate the components of the $\omega$-statistic for any configuration. When the left and right sub-regions are defined by $[i, k]$ and $[k + 1, j]$, respectively, then the numerator is the sum $Z_{i,k} + Z_{k+1,j}$ weighted by the number of calculations $[\binom{k-i+1}{2} + \binom{j-k}{2}]^{-1}$, whereas the denominator is $Z_{i,j} - Z_{i,k} - Z_{k+1,j}$ weighted by $[(k - i + 1)(j - k)]^{-1}$.