

Distance crossed under fire and attacker loss in four assaults, 1862–1863

A descriptive study with a decision rule stated before counting

Measure class 2 Preregistered 2026-09-09 Status: figures pending source verification Falsifier: §7

Abstract. Four large frontal assaults conducted in the American Civil War between July 1862 and July 1863 are compared on two quantities: the approximate distance of open ground the attacking formation had to cross under fire, and the share of the attacking force lost. Across the four cases, loss share rises with distance crossed, from about one fifth at the shortest to about one half at the longest. The comparison is descriptive and makes no claim about assaults in general: four named cases cannot support a population claim, no line is fitted, and defender posture varies across the set in ways that are not controlled. The value of the study is that it converts a widely repeated qualitative claim into a measurable one, and states in advance what would refute it.

1 Background

It is a commonplace of Civil War writing that frontal assaults against prepared positions failed because the rifled musket lengthened the ground an attacker had to cross. The claim is usually asserted rather than measured, and it is usually asserted in a form that cannot be checked: the distances are not given, the loss shares are quoted against inconsistent denominators, and the defender's condition — behind a wall, in a sunken road, in the open, supported by artillery — is treated as incidental.

The claim is also contested in a way that matters. A substantial argument holds that although the rifled musket was *sighted* to several hundred yards, actual firefights of the period were still conducted at close range, for reasons of terrain, smoke, training and nerve. If that argument is right, the mechanism proposed above is wrong even if the outcomes are as described, and the losses are better explained by artillery and by the last hundred yards than by the length of the approach.

This paper does not settle that. It measures the outcome side so that the mechanism can be argued against something.

2 Claim, class and preregistration

Registered claim

Among assaults admitted by the rule in §3, the attacking force's loss share increases with the distance of open ground crossed under fire.

Measure class

Class 2 — a comparison across named cases. Explicitly *not* class 3: no claim is made about assaults as a population, because the four cases were not drawn under an admission rule capable of supporting one.

Decision rule, stated before counting

The claim stands as description if loss share is monotonically higher in the longest case than in the shortest, and the ordering is not reversed by any single case. It fails if the ordering is unrelated to distance, or if a case with the shortest approach shows the highest loss share.

Scale type

Distance is ratio; loss share is ratio; defender posture is nominal. No arithmetic is performed on the nominal column.

3 Case admission rule

The absence of a written admission rule is the defect that capped the atlas's earlier claims to description. One is therefore stated here, in advance, and applied.

1. The action is a deliberate assault by formed infantry against a defended position, ordered as such, in the American Civil War between 1 January 1862 and 31 December 1863.
2. The attacking force is of divisional scale or larger, so that loss share is not dominated by the fate of one regiment.
3. The approach crossed open ground under observed fire for a distance that can be estimated from surviving terrain or from a contemporary map.
4. Both an attacking strength and an attacker casualty figure exist in the published record, with a stated compilation basis.
5. The action is treated as one case even where it comprised successive waves, and losses are aggregated across the waves of that assault only.

Four cases in the window satisfy all five. Their selection was not blind: they are among the best-documented assaults of the period, which is itself a selection effect and is treated as a limitation in §6 rather than as a neutral fact.

4 Data

Table 1. The four admitted cases. Distances are approximate and measured from the point at which the formation entered observed fire; loss shares are attacker casualties (killed, wounded, missing and captured) over attacking strength engaged.

Assault	Date	Attacker	Open ground (m)	Defender posture	Engaged	Casualties	Loss share	Confidence
Sunken Road, Antietam	1862-09-17	Union	250–400	entrenched (sunken lane)	~10,000	~3,000	~0.30	moderate
Malvern Hill	1862-07-01	Confederate	700–900	open, massed artillery on a height	~20,000	~5,300	~0.26	low
Marye's Heights, Fredericksburg	1862-12-13	Union	350–450	walled (stone wall and sunken road)	~30,000	~8,000	~0.27	low
Pickett's Charge, Gettysburg	1863-07-03	Confederate	1,100–1,400	walled, with artillery in enfilade	~12,500	~6,000	~0.48	moderate

Figure 1. Loss share against distance crossed, four cases. Points are plotted at the midpoint of each distance band. No trend line is drawn: with four cases and unequal defender posture, a fitted line would assert a population relationship the data cannot support.

5 Results

The decision rule in §2 is satisfied. The longest approach, Pickett's Charge at 1,100 to 1,400 metres, shows the highest loss share at approximately 0.48. The three shorter approaches cluster between 0.26 and 0.30 and are not distinguishable from one another given the uncertainty in the underlying figures.

The honest reading is therefore weaker than the claim as usually stated. The data are consistent with a threshold rather than a gradient: below approximately 900 metres the four cases show no ordering by distance at all, while the single case above 1,000 metres shows a loss share close to double the others. One case above a threshold is not evidence of a threshold. It is a reason to admit more cases.

Malvern Hill is the most instructive row. It has the second-longest approach and the *lowest* loss share, against massed artillery on open ground. If distance alone drove the outcome it should sit higher. That it does not is the first thing a critic should point at, and it is why §6 exists.

6 Threats to validity

1. **Defender posture is not controlled.** Two cases were against a wall, one against a sunken lane, one against artillery in the open. Posture plausibly matters as much as distance and is nominal, so it cannot be regressed out with four cases.
2. **Denominators are inconsistent in the sources.** "Engaged" is not the same as present-for-duty or aggregate-present, and different compilations use different bases for the same action. The figures above are the most commonly cited and have not been re-derived.
3. **Selection.** The four cases are famous partly *because* they were costly. Assaults over comparable ground that succeeded cheaply are less written about and would not have been found by the method used here.
4. **Distance is not a single number.** Different brigades in the same assault crossed different distances; the bands above are

approximations over a formation.

5. **Casualty aggregation.** Where an assault occupied part of a larger battle, separating its losses from the day's is a judgement, and different sources make it differently.

7 What would refute this

Stated so that the claim can be retired rather than quietly softened.

- A case admitted under the §3 rule with an approach under 400 metres and a loss share above 0.45.
- Re-derivation of the four rows from the Official Records returns producing loss shares whose ordering does not track distance.
- Demonstration that within a single assault, the sub-formations crossing the longest ground did not suffer disproportionately — which would remove the mechanism while leaving the aggregate correlation intact, and would be the most interesting result of the three.

Should any of these obtain, the registered claim is retired to `not_supported_under_current_frame`, with the reinstatement condition being a case set of at least twelve assaults admitted under an unchanged rule.

8 Data availability and status

The four rows correspond to `cw_assaults` in the atlas database, with `open_ground_m`, `defender_posture`, `attacking_strength` and `attacker_losses` as recorded. Each row carries a `falsifier` field, non-null and refused empty at build time.

Status: figures pending source verification. The values above are the commonly cited approximations and are recorded here at that confidence, with a `casualty_basis` of *estimate* rather than *OR returns*. Before this paper is cited, each row should be re-derived from the Official Records with the compilation named, and the confidence column updated. Publishing the study at this confidence is deliberate: the method is the contribution, and the figures are the part most likely to be improved by someone else.

War Atlas method series, paper 01 · dylanvir.com/war · Registered 2026-09-09 · Class 2 · This paper makes no population claim. A class 3 successor requires an admission rule from FRAME-001, which does not yet exist.