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# Collaboration and Influence

A Network Analysis of Legislative Co-sponsorship in the Pakistani Parliament

## 01. Introduction

- Subject: Analyzing legislative co-sponsorship networks (2013–2024) to reveal the true structure of political cooperation beneath public polarization.
- Key Questions:
  - Does the parliament exhibit an efficient "small-world" structure or is it fragmented?
  - Who are the central actors, and does legislative activity correlate with structural influence (brokerage)?

## 02. Literature Review

- Co-sponsorship: A robust proxy for genuine legislative collaboration (Fowler, 2006).
- Small-World Networks: Structure (high clustering/short paths) optimizes information flow (Cho & Fowler, 2010).
- Pragmatism: Functional cooperation can persist between ideologically hostile parties (Crewe & Taylor-Robinson, 2025).

## 03. Methodology

- Conceptual Framework:** Quantitative Social Network Analysis
- Analysis tools:** GEPHI, R, PYTHON
- Network Model:** Undirected, Weighted Social Network.
  - Nodes (N=398):** Unique Legislators.
  - Edges (E=2,409):** Co-sponsorships, weighted by frequency.
- Data Source:** Open Parliament Pakistan; 14th, 15th, and 16th Assemblies (2013–2024).

## 04. Analysis

Table 1: Structural Analysis - Model Comparision

Metric	Pakistani Parliament	Random	Small.World	Scale.Free
Edges	2350	2350	2538	2220
Avg. Degree	16.667	16.667	18	15.745
Avg. Path Length	5.942	2.293	2.501	2.303
CC	0.5461	0.0604	0.3741	0.1249
Communities	14	6	4	6
Modularity	0.6968	0.1999	0.5069	0.194

The Pakistani Parliament Network is most associated with the Small-World Model.

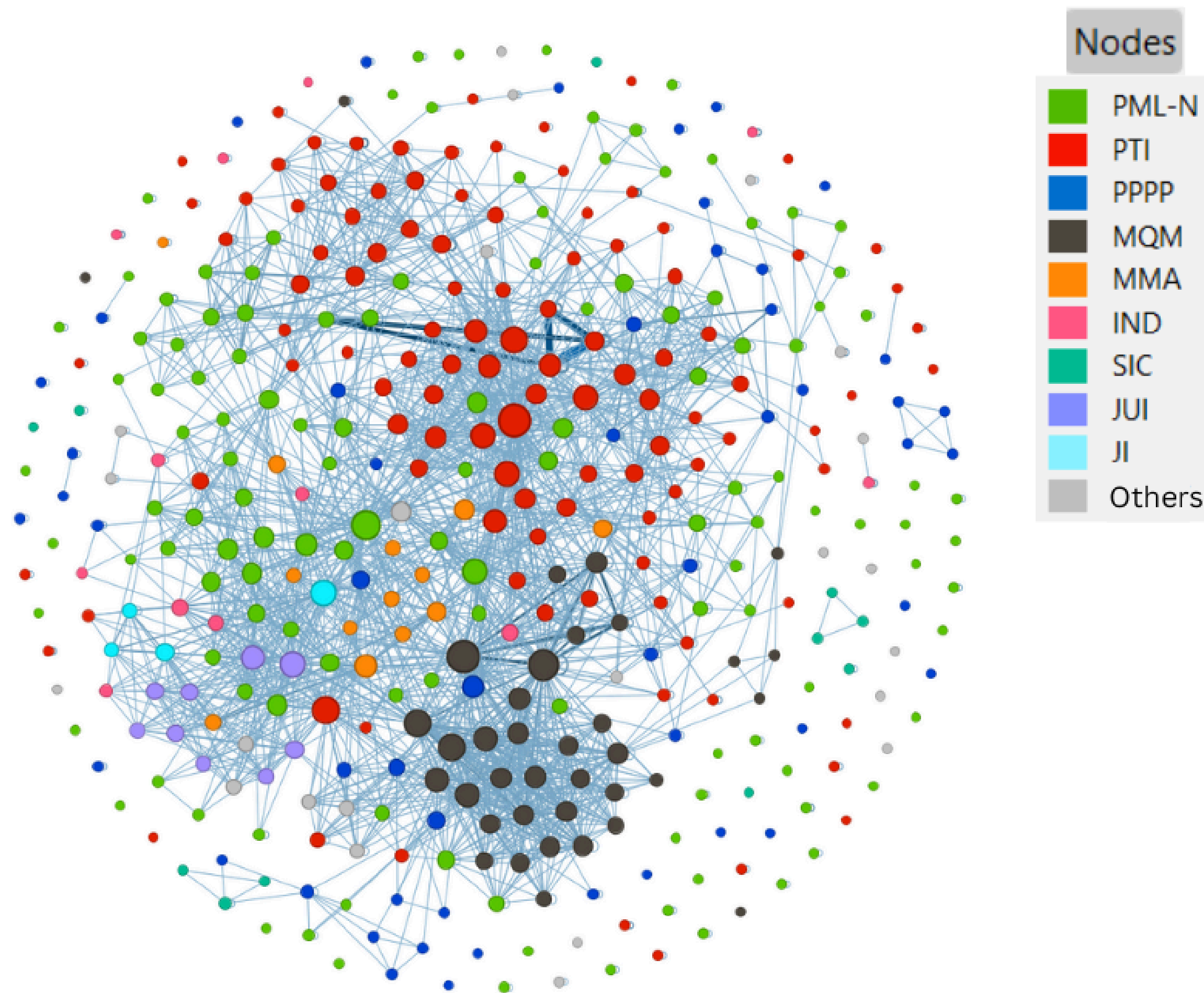


Figure 1: Pakistani Parliament co-sponsorship Network showing legislators bill cosponsorship collaboration

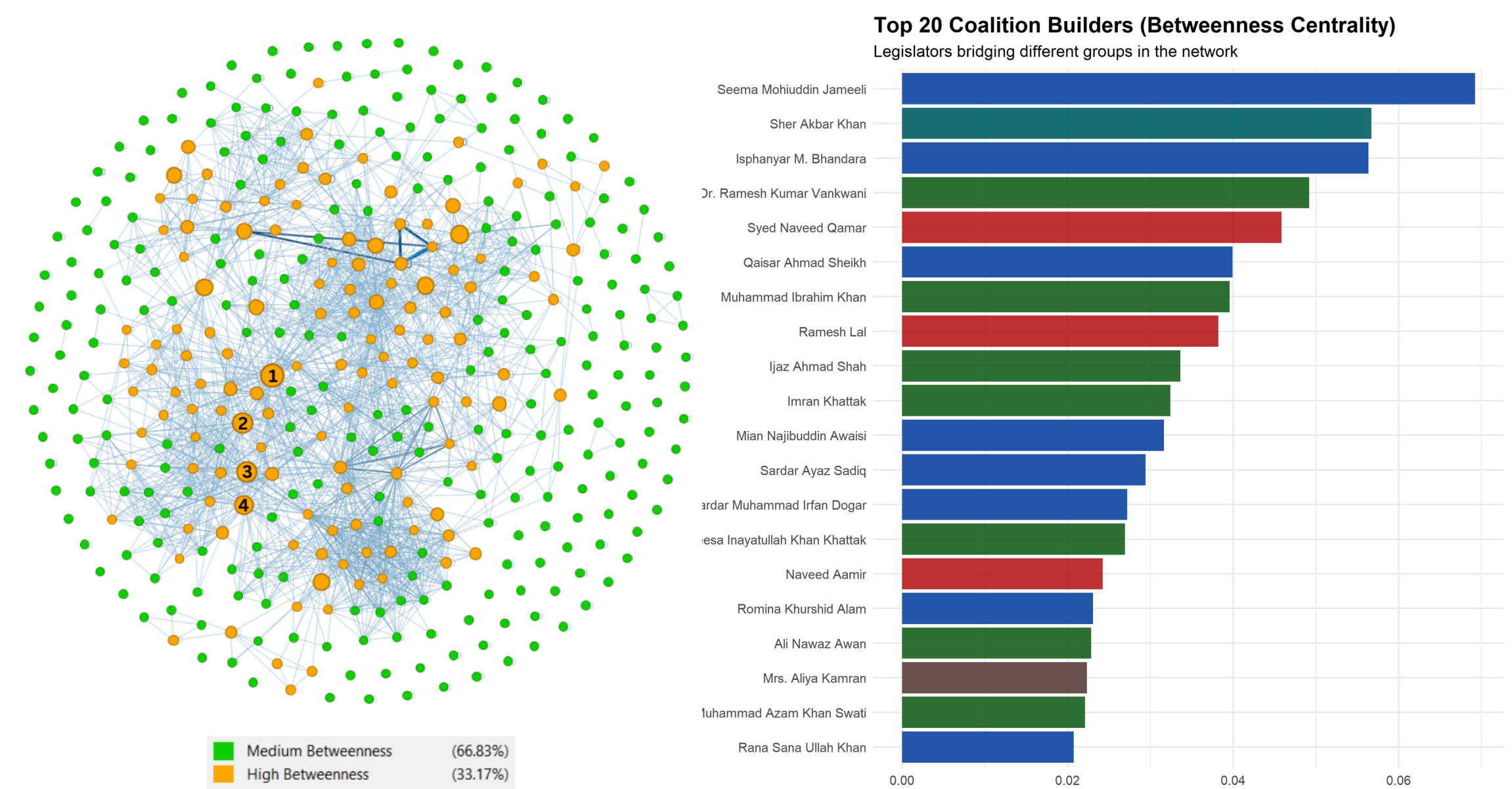


Figure 2: Betweenness centrality Network

PML-N legislators disproportionately control the flow of legislative cooperation

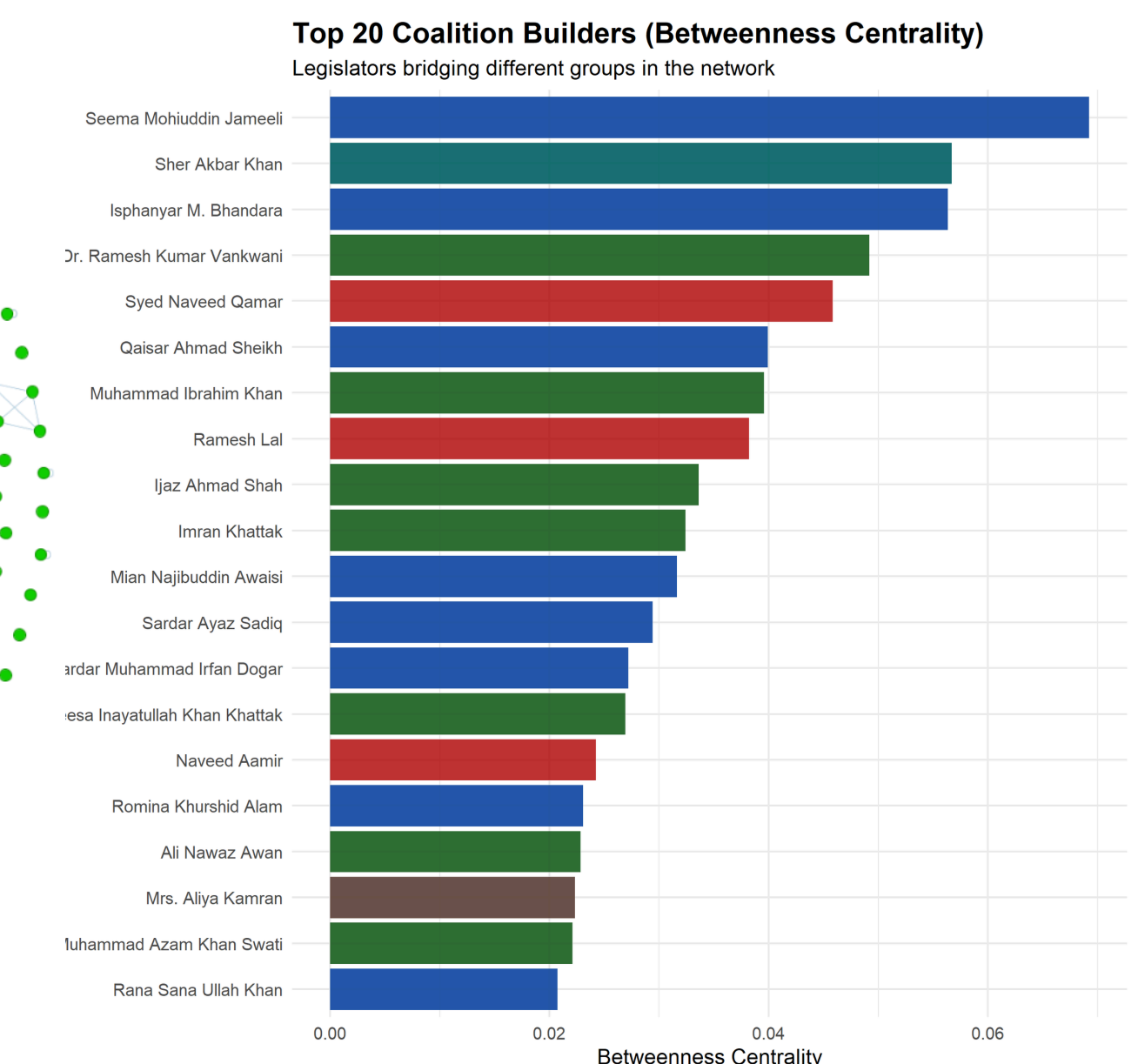


Figure 3: Top 20 Betweenness centrality Legislators

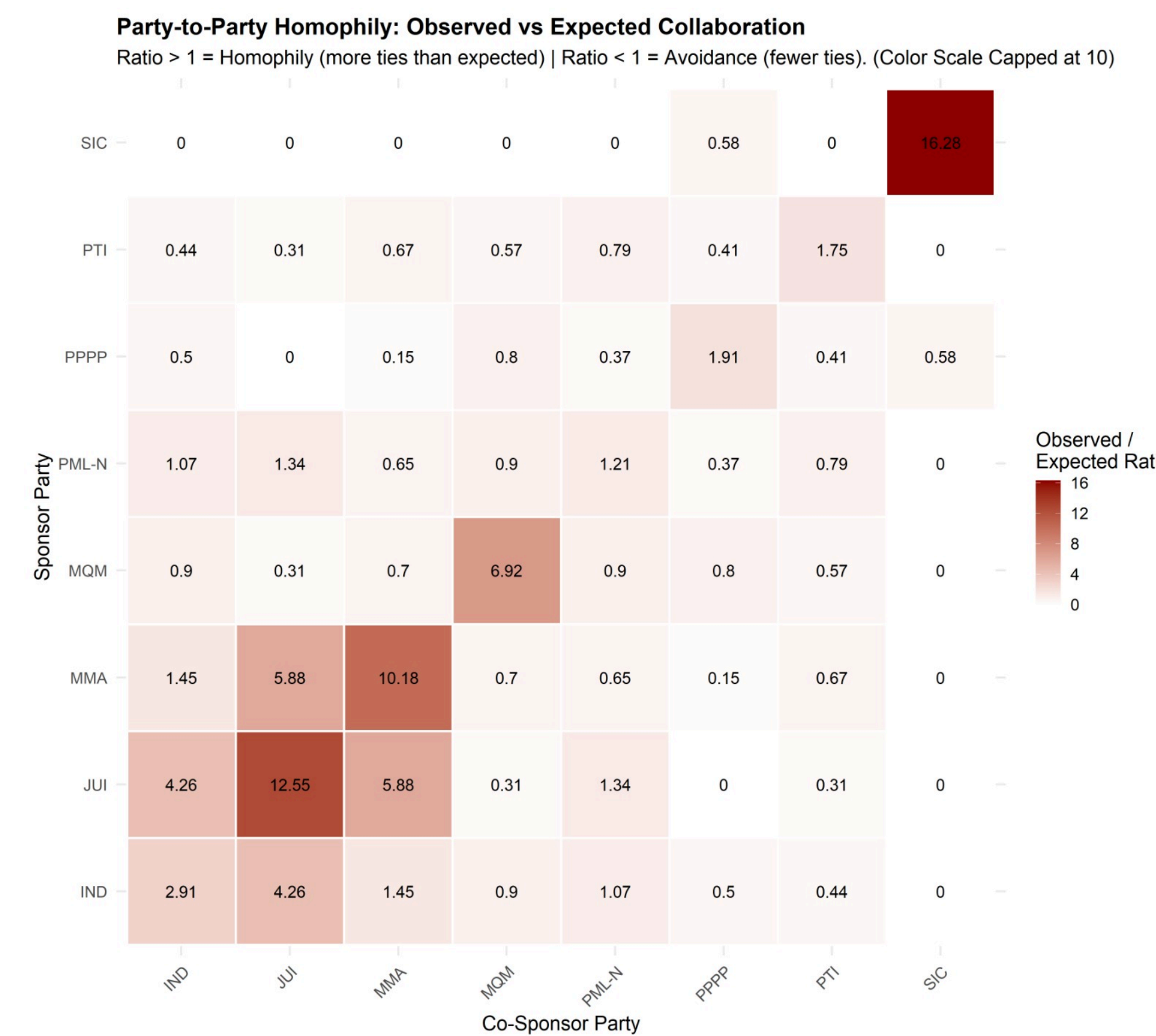


Figure 4: Party Homophily & Polarization Heatmap

## 05. Conclusion

### Key Finding 1: Efficient, Yet Precarious Structure

- The Paradox: The parliament operates with Small-World efficiency, guaranteeing that any bill or idea can travel between legislators in about 6 steps. But this efficiency is undermined by high internal polarization and Modularity, confirming the network is built of rigid, tightly clustered party cliques.

### Key Finding 2: Division of Labor: Volume vs. Brokerage

- Legislators from PTI and MQM dominate the network in terms of legislative activity and volume of co-sponsored bills. However Members of PML-N overwhelmingly occupy the highest-ranking positions in structural influence, confirming their role as the primary cross-party brokers.

### Key Finding 3: Systemic Vulnerability

- The stability and connectivity of the entire network relies heavily on this small, crucial set of PML-N brokers who bridge the divide between otherwise fragmented political factions so the loss or coordinated removal of these key connectors could drastically increase the network's path length, resulting in severe legislative gridlock and complete structural fragmentation of the lawmaking process.