

【長崎大学経済学部ディスカッション・ペーパー・シリーズ】

DISCUSSION PAPER SERIES

Faculty of Economics, Nagasaki University

No.2016-01 (July 2016)

## **A Conditional Version of the Strong Law of Large Numbers in Separable Banach Spaces**

**Takuhisa Shikimi** (Faculty of Economics, Nagasaki University)

### **Abstract**

Let  $\mathcal{X}$  be a separable Banach space. Suppose that  $X_1, X_2, \dots$  are  $\mathcal{X}$ -valued random variables that are conditionally i.i.d. given a sub  $\sigma$ -algebra. We show that, conditionally on the sub  $\sigma$ -algebra,  $n^{-1} \sum_{i=1}^n X_i$  converges to the conditional expectation of  $X_1$  a.s. We prove this convergence by the unconditional version of the strong law of large numbers in  $\mathcal{X}$ .

**Keywords** Conditional independence; Conditional strong law of large numbers; Separable Banach spaces