

*Data feature article*

## **Measuring extraordinary rendition and international cooperation<sup>1</sup>**

**Rebecca Cordell**  
**Department of Government**  
**University of Essex**

### **Abstract**

Following the launch of the global war on terror, the United States of America established a global rendition network that saw the transfer of CIA terrorist suspects to secret detention sites across the world. There has been considerable debate over how many countries participated in rendition and secret detention during the post-9/11 period, and conventional accounts of foreign complicity suggest that diverse countries were involved, including many established democracies. However, research on rendition has been plagued by uncertainty, a lack of data and systematic empirical evidence due to the secret nature of counterterrorism cooperation. In this article, I argue that it is possible to study the practice of rendition, unlike many other forms of clandestine security cooperation, as it is partially observable. Specifically, suspected extraordinary rendition flight paths can be tracked using publicly available flight data. This article uses the world's largest set of public flight data relating to rendition to estimate cross-country collaboration in rendition and secret detention. The result suggests 307 likely rendition flights and 15 new participating countries beyond the 54 known cases, with cross validation tests demonstrating high levels of model accuracy.

### **Keywords**

Measurement, extraordinary rendition, international cooperation, international security, human rights

### **Introduction**

On February 17 2003, the Egyptian Cleric and former Militant Islamist Abu Omar, was

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stopped by the police in Milan, Italy and abducted by a group of disguised men. He was blindfolded, beaten and driven in the back of a van to a United States (U.S.) airbase in Aviano, Italy – and rendered to Cairo, Egypt on a Gulfstream IV Jet (via a U.S. airbase in Ramstein, Germany). Over the next four years he was tortured on behalf of the Central Intelligence Agency (CIA) (Council of Europe, 2008).

After the 9/11 attacks, the U.S. launched a secret rendition network that enabled the transfer of CIA terrorist suspects to secret detention sites (All Party Parliamentary Group on Extraordinary Rendition, 2009; Senate Select Committee on Intelligence, 2014). Extraordinary rendition operations used private civilian aircrafts to conceal detainee transfers. They are believed to have been most active between 2001-2005, and had the assistance of over a quarter of the world's countries (Open Society Foundations, 2013; Blakeley and Raphael, 2013a). International cooperation in rendition included states hosting CIA secret detention sites; providing staging posts for rendition flights to rest, refuel and regroup; sharing intelligence during detainee interrogations; and carrying out the arrest, capture, detention and interrogation of detainees on behalf of the CIA (United Nations, 2010).

How many countries participated in rendition and secret detention during the post-9/11 period – and to what extent? The most frequently cited account of foreign complicity comes from the Open Society Foundations' (2013) *Globalizing Torture: CIA*

*Secret Detention and Extraordinary Rendition* report and points to 54 countries as being involved – a diverse set including many of the world’s established democracies.<sup>1</sup> However, there has been considerable debate over how many countries participated in rendition and secret detention during the post-9/11 period. For example, the European Parliament and Council of Europe concluded their corresponding investigations into the alleged use of European countries by the CIA for the transport and illegal detention of prisoners with different lists of countries (in Europe and elsewhere) that they suspected were involved (Council of Europe, 2006; European Parliament, 2007). Similarly, while Blakeley and Raphael (2013) identify over 400 “highly suspicious” flight circuits that land in a total of 84 countries across the globe, the United Nations (UN) (2010) only include 20 countries in their allegations concerning involvement in secret detention practices in the Global War on Terror since 11 September 2001 (UN, 2010; Blakeley and Raphael, 2013a). This characteristic is not unique to the task of determining the number of countries that were involved as there are also conflicting accounts concerning many other details of the war on terror extraordinary rendition and secret detention programme. For example, during the early years of the global war on terror, there were reports that thousands of CIA terrorist suspects had been processed through the rendition “system” (Stafford Smith, 2008; Hooper, 2009). Whereas, recent investigations on U.S. rendition and secret detention operations have only been able to

confirm the identity of 131 individuals subjected to the CIA's Detention and Interrogation Program (Open Society Foundations, 2013; Blakely and Raphael, 2013b; Senate Select Committee on Intelligence, 2014). The secret nature of counterterrorism cooperation has left previous qualitative research plagued by uncertainty, an absence of data and systematic empirical evidence (Hafner-Burton and Shapiro, 2010; Efrat, 2015). In addition, many governments have been reluctant to admit to their participation in rendition due to national security concerns or political and legal consequences (Brysk and Shafir, 2007).

Together these factors have made it difficult to estimate the countries involved in rendition as well as the number of cases of secret detention during the post-9/11 period. This article contributes to a wider discussion within the field of political science that considers how to deal with the issues involved in measuring partially observable processes such as repression and human rights violations. Brysk (1994) describes the systematic measurement of complex political processes as "the first critical step" in quantitative research. Recent research in international relations and human rights has continued this call by emphasizing the importance of adopting measured and careful analyses grounded in accurate data (Fariss, 2014; Dancy and Fariss, forthcoming). By revisiting the debate over how many countries participated in rendition and secret detention during the post-9/11 period and providing more accurate estimates of

international cooperation, this article fills a gap in the literature that can facilitate further studies on this topic by academic researchers and human rights practitioners. For example, the data produced by this paper provides new opportunities for international security researchers to analyse the causes and dynamics of international cooperation under conditions of secrecy that are typically hidden by their very nature. Beyond the topic of extraordinary rendition and secret detention, these findings could be used to predict future counterterrorism cooperation and evaluate the characteristics of those countries that are more or less likely to engage in similar kinds of repressive behavior in secret. The results can also be useful both for investigative researchers and NGOs interested in using the data for advocacy purposes; particularly those states that have continued to enjoy impunity from their actions due to a lack of evidence.

How can we measure international cooperation in such a deeply sensitive area of international politics? Unlike other forms of clandestine security cooperation, the practice of rendition has the advantage of being observable, as we can analyse suspected extraordinary rendition flight paths using publicly available flight data. Past attempts to identify and track the aircraft used by the CIA as part of the post-9/11 rendition, detention and interrogation programme include the Rendition Project – headed by Professor Ruth Blakeley, University of Kent and Dr Sam Raphael, University of Westminster. Blakeley and Raphael (2013c) map more than 11,000 individual flights

related to rendition and identify more than 60 rendition flights that closely match known dates when prisoners were moved between secret prisons.

However, this analysis only accounts for the transfer of 34 individuals into CIA custody, and leaves a vast gap between the number of confirmed prisoners that were enrolled into the CIA Detention and Interrogation Program (Open Society Foundations, 2013; Blakely and Raphael, 2013b; Senate Select Committee on Intelligence, 2014). This method is likely to undercount actual rendition flights and may also be problematic for instances where the identity of individuals subjected to CIA rendition cannot be revealed due to national security concerns.

To overcome these limitations in identifying rendition flights and the countries likely involved, I apply data pre-processing methods to the Rendition Project Database of flights (Blakeley and Raphael, 2013c). I build a Rendition Flight Specification Model based on the characteristics of confirmed high profile detainee renditions and estimate binary outcomes for more than 11,000 flights related to rendition. My results suggest an additional 307 rendition flights that are identical in every observable way to known renditions and 15 previously unidentified countries. This research shows how systematic empirical analysis of international cooperation in post-9/11 rendition and secret detention is possible using public flight data, and provides a more general foundation for research to measurement challenges on international security and human

rights events.

### **Data and methods**

The Rendition Project Database represents the world's largest collection of public flight data possibly related to rendition, comprising 11,000 individual flights landing in 136 countries for the period 2001-2012 (Blakeley and Raphael, 2013c). Blakeley and Raphael (2013c) compile their dataset by gathering flight data from several European intergovernmental investigations, government and parliamentary inquiries, NGOs and Investigative Journalists. The original data result from numerous Freedom of Information requests made to air navigation organisations (such as Eurocontrol and the Federal Aviation Agency) that show the flight plans of aircrafts suspected of being used for extraordinary rendition purposes. Every flight within the dataset contains information on the aircraft; flight route; companies involved in each journey; and suspected detainees onboard (see Appendix 1). Blakeley and Raphael (2013a) utilize the data by producing an interactive flight database that visualizes the flight path of every flight in the dataset on a world map and identify more than 60 rendition flights that closely match known dates when prisoners were moved between secret prisons. This process tracing analysis has been underpinned by a range of primary material including prisoner testimonies, declassified documents, flight records, company invoices and court documents (Blakely and Raphael, 2013a). This article looks beyond this limited

number of flights to uncover further flights within the dataset that share the same characteristics of known renditions but where the transfer of a detainee is unknown (due to the secret nature of these operations).

While the data are dyadic and record a flight between two airports, international cooperation in rendition is best understood in terms of rendition circuits.<sup>2</sup> Due to the limited size of the private civilian aircrafts used by the CIA, rendition operations tended to include a series of flights where aircrafts could rest, refuel and regroup (commonly in Western Europe) during a long journey from the U.S. to secret detention sites located in Eastern Europe, North Africa and Asia (Open Society Foundations, 2013). Despite a detainee only being onboard the aircraft for one or two legs of the circuit, the detainee transfer would not be possible without these additional flights, as explicitly stated in the UN model of international counterterrorism cooperation in secret detention (see Table 1).

**Table 1.** International cooperation in rendition and secret detention post-9/11.

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- (a) Hosting CIA secret detention facilities
  - (b) Assisting with the arrest, capture, detention and interrogation of detainees
  - (c) Sending or receiving intelligence or interrogation questions
  - (d) Providing staging posts for rendition flights to rest, refuel and regroup
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Source: United Nations 2010

The dependent variable in the analysis is binary, namely whether a flight is likely to be a rendition flight or not. The proposed model estimates the probability of a flight being



a rendition flight based upon its similarity to confirmed high profile detainee renditions.<sup>3</sup> Building upon previous research on extraordinary rendition, a binary outcome is established for each flight within the dataset according to the degree to which it demonstrates typical characteristics of a rendition flight listed in Table 2 (European Parliament, 2006; Council of Europe, 2008; United Nations, 2010; Open Society Foundations, 2013; Blakeley and Raphael, 2013c; Raphael, Black, Blakeley et al., 2015). The following restrictive parameters directly correspond to the structural qualities of known rendition flights that can be observed using public flight data.

**Table 2.** Rendition flight specification model (dummy variables).

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- (a) Flight lands within close proximity to a confirmed CIA secret detention site
  - (b) Flight lands at a well-known staging post during the circuit
  - (c) Aircraft has been previously used during past renditions of detainees
  - (d) Flight lands at Washington Dulles International Airport during the circuit
- 

First, a flight must land within close proximity to a confirmed CIA secret detention site after September 11 2001. Second, the circuit must also include a flight to a well-known staging post where previous flights connected to a high profile detainee rendition landed at in order for the aircraft to rest, refuel and regroup. Third, the aircraft flight registration number must also have been used during high profile detainee renditions in the past (United Nations, 2010; Open Society Foundations, 2013). Finally, the circuit must also include a flight that landed at Washington Dulles International Airport, where

confirmed high profile detainee rendition circuits typically began and completed their journey in order to pick up and drop off rendition teams (see Appendix 2 for the content of all the covariates) (Shane, 2005; Council of Europe, 2008).

This objective framework differs from previous research on rendition in avoiding reliance on speculation and circumstantial evidence to identify rendition flights (Blakeley and Raphael, 2013c). For example, this measurement model does not require a flight to match known dates when prisoners were moved between secret prisons that could result in over fitting. For example, there are many security reasons other than rendition that the CIA may wish to contract a private civilian aircraft for. Moreover, luxury aircrafts are also routinely booked by corporate and private clients for a range of personal and business purposes.

I use matching to preprocess the public flight data and measure extraordinary rendition. Flights are matched on exactly the same values of the covariates outlined in the Rendition Flight Specification Model in Table 2 and discarded if they do not exhibit any of these features. The matched dataset is divided into treatment and control groups, whereby flights assigned to the treatment include the 61 rendition flights identified by the Blakeley and Raphael (2013c) and flights assigned to the control include new flights identified by this article (Ho, Imai, King et al., 2007).

The particular algorithm for matching that has been selected for this analysis is exact matching; which ideally finds multiple matches within the Blakeley and Raphael (2013c) dataset on all of the individual variables contained within the Rendition Flight Specification Model (Morgan and Harding, 2006). Flights within the control group are identical in every observable way to their confirmed rendition flight counterparts within the treatment group (Gu and Rosenbaum, 1993). This approach represents the first attempt to systematically quantify the uncertainty of identifying rendition flights during the post-9/11 period.<sup>4</sup>

## **Results**

The results support the idea that confirmed high profile rendition flights share measureable common characteristics that enable us to predict the likelihood of other previously unconfirmed rendition flights. The results from the model are shown in Table 3 and suggest 307 new likely rendition flights within the Rendition Project Database and 15 previously unidentified participating countries. Successful matches are found for 1,218 observations while 9,698 units are discarded due to their distinct dissimilarity to the 61 previously identified rendition flights. The successfully matched sample is then disaggregated into five subgroups. Previous unidentified rendition flights (control group) share the exact values on each of the covariates to confirmed rendition flights (treatment group) within the same subgroup (see Table 3). I interpret flights in

the first subgroup as most likely to be rendition flights given that they meet all of the conditions outlined in the Rendition Flight Specification Model.

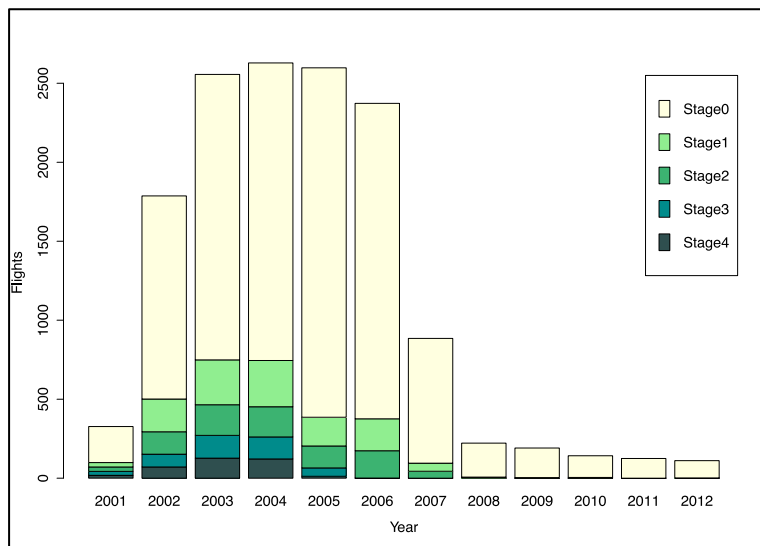
**Table 3.** Results from matching.

<b>Sample sizes</b>							
		<i>Control</i>	<i>Treated</i>				
All		10916	61				
Matched		1218	61				
Discarded		9698	0				
<b>Matched sample sizes</b>							
Subgroup	Treated	Control	Total	Detention	Staging	Aircraft	Washington
1***	43	307	350	Yes	Yes	Yes	Yes
2	10	83	93	Yes	Yes	Yes	No
3	5	155	159	Yes	No	Yes	Yes
4	1	32	33	Yes	No	Yes	No
5	3	641	644	No	Yes	Yes	Yes

\*\*\*Subgroup containing those flights most likely to be rendition flights.

Flights within the second subgroup satisfy all but the fourth indicator, i.e., a flight within the same circuit landing at Washington Dulles International Airport.<sup>5</sup> Flights within the third subgroup meet every requirement outlined in the Rendition Flight Specification Model except for landing at well-known staging post where rendition flights in the past had landed to rest, refuel and regroup.<sup>6</sup> Flights within the fourth subgroup only demonstrate half of the characteristics outlined in the Rendition Flight Specification Model, i.e., a flight landing in a secret detention site and taking place on an aircraft used during past renditions. Finally, flights within the fourth subgroup fail to satisfy the most important condition, namely landing in a secret detention site. Figure 1

represents the distribution of the various subgroups in the analysis over the time period 2001-2012.



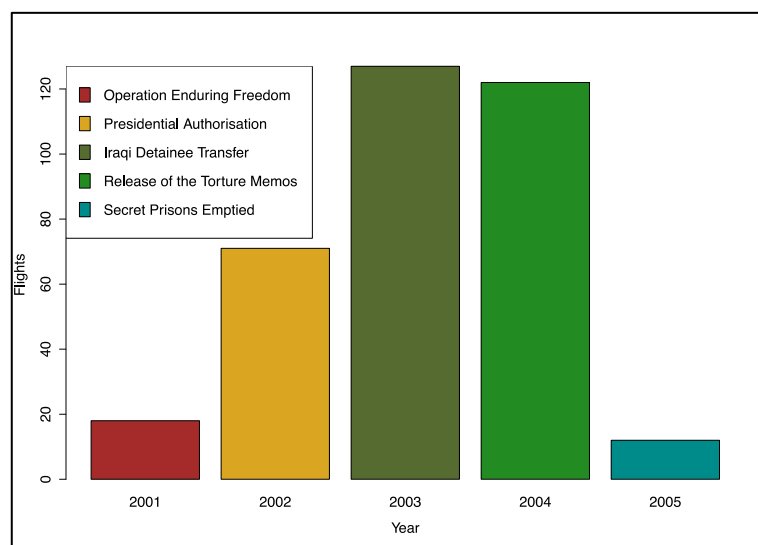
**Figure 1.** Distribution of flights during each stage of matching. Matching Stage 0 represents the original dataset prior to matching, while matching Stages 1-4 represents each phase of matching.

Matching Stage '0' represents the distribution of flights over time in the original dataset prior to matching. Matching Stage '1' represents the first actual stage of matching and includes only those flights which satisfy the first predictive condition within the Model, requiring a potential rendition flight to land within close proximity to a confirmed secret detention site. This stage discards 9,712 flights from the matching model but still includes flights that run from each of the annual extremes of the dataset. Next,

Matching Stage '2' reduces the distribution of flights over time from 2001-2007 and discards 354 flights from the model that do not satisfy the first and second condition outlined in the Rendition Flight Specification model; requiring a flight to land within close proximity to a confirmed secret detention site and land at a well-known staging post used during past renditions. Accordingly, matching Stage '3' includes those flights which land at a secret detention site; also land at well-known staging post used during past renditions; and takes place on an aircraft contracted by the CIA for rendition purposes. This third stage of matching discards 468 flights from the model and reduces the distribution of flights within the dataset overtime from 2001-2005. Finally, the fourth stage of matching includes the 350 flights contained in subgroup 1 that satisfy every covariate within the Rendition Flight Specification Model (including that a flight within the circuit also landed at Washington Dulles International Airport). This final stage of matching discards 93 flights from the model. This indicates that the most likely rendition flights were confined to the period 2001-2005, with the majority taking place between 2003-2004. These findings tell a story that is consistent with the historical events that took place during the early years of the global war on terror (see Figure 2).

For example, we should expect few flights in 2001 compared to subsequent years, since rendition operations did not officially start until the end of 2001 after the 9/11 attacks (Fitzpatrick, 2002-2003). The increase of flights in 2002 coincides with the

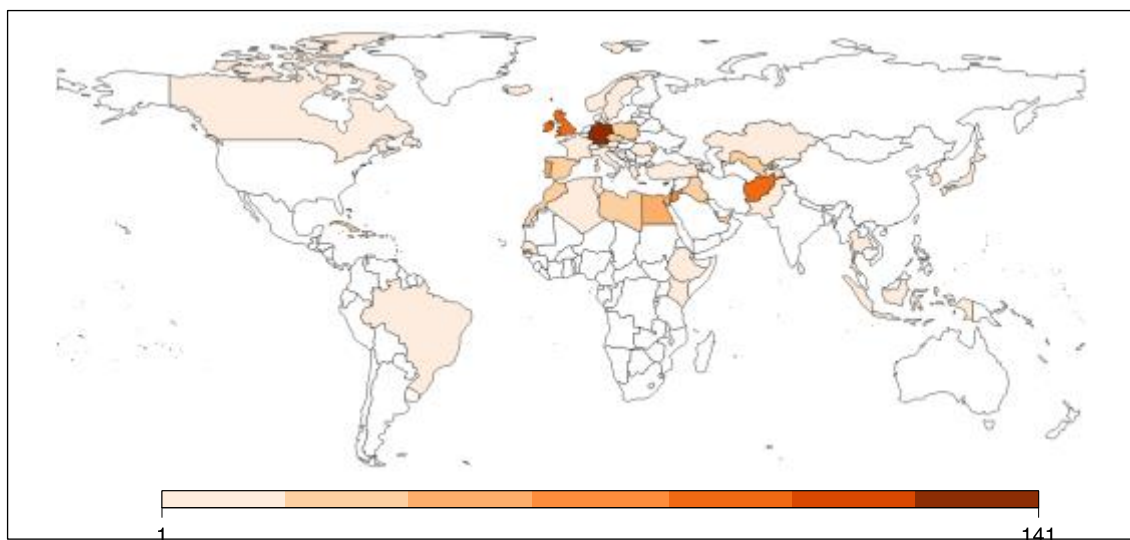
presidential authorization permitting the CIA to use enhanced interrogation techniques on detainees (Andrew and Tobia, 2014). Similarly, the peak around 2003 and 2004 coincides with the U.S. Justice Department drafting a memo authorizing the CIA to



**Figure 2.** Distribution of identified rendition flights.

transfer detainees out of Iraq for interrogation (Radnofsky, 2008). Moreover, the drop in flights in 2005 follows the release of the “Torture Memos” in 2004 that provided the legal basis for approval of the mistreatment of detainees during the war on terror (Allen and Priest, 2004). This finding links patterns in rendition flights to the U.S. government’s need for support from global public opinion to obtain successful international cooperation on other areas (Hafner-Burton and Shapiro, 2010).

By tracking the flight paths of suspected extraordinary rendition aircrafts, one can analyse all of the flights within a circuit; including those that facilitate the refueling of an aircraft before and after the transfer of a CIA terrorist suspect to a secret detention site where they face the risk of torture (see Figure 3). Figure 3 maps the frequency of



**Figure 3.** Frequency of rendition circuits.

Frequency of flights, with darker shades indicating higher values, and white for countries not identified by the analysis (excluding the U.S.).

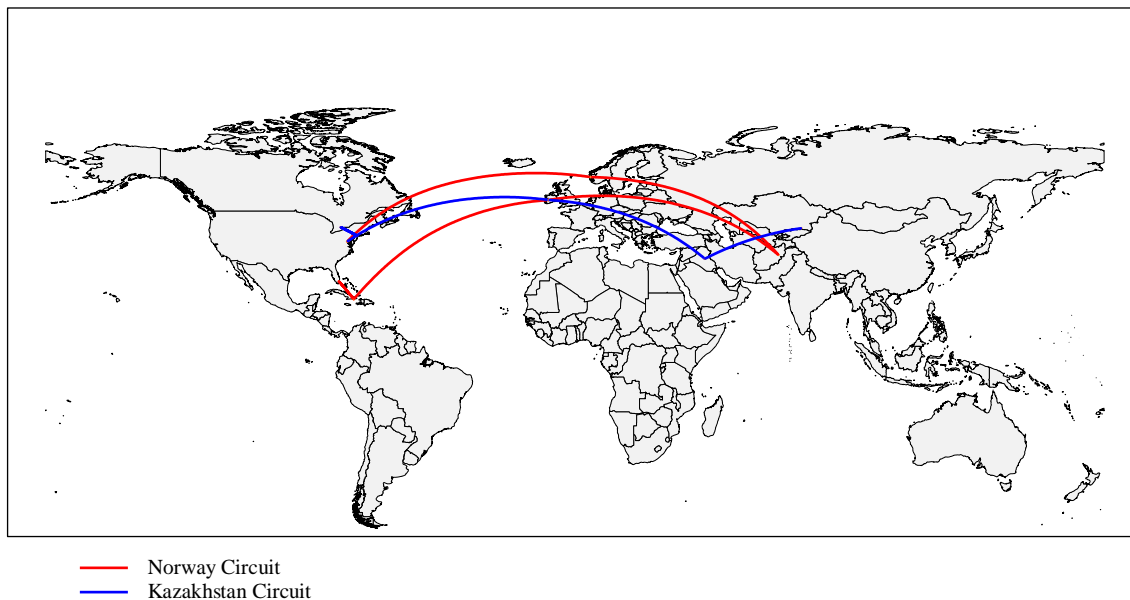
rendition circuits by countries based on the identified likely rendition flights in subgroup 1. The most frequently visited secret detention sites within Subgroup 1 include 96 flights that land in Kabul between 2002-2005. This is not surprising since several CIA secret prison sites were reportedly established within close proximity to



Kabul International Airport after the launch of Operation Enduring Freedom in Afghanistan in October 2001 (Reprieve, 2015). After Afghanistan, the next five secret detention sites that receive the greatest amount of likely rendition flights are located in Amman, Jordan (65 flights), Cairo, Egypt (43 flights), Rabat, Morocco (37 flights), Baghdad, Iraq and Tashkent, Uzbekistan (both 28 flights each). All of these flights take place between 2001 and 2005, in line with previous research on rendition, which claim that, the CIA frequently outsourced interrogations to detention facilities within these countries (Irish Times, 2007; Urry, 2014). See Appendix 3 for the full country list of rendition flights. On the other hand, (excluding the U.S.) countries that received the greatest number of flights within a rendition circuit include Germany, Ireland, the U.K., Portugal and Cyprus. Such countries have been at the center of high profile governmental inquiries and investigations on state complicity in rendition (All Party Parliamentary Group on Extraordinary Rendition, 2009; State Watch, 2009). See Appendix 4 for the full country list of rendition circuits.

The UN model of international cooperation in rendition post-9/11 in Table 1 demonstrates that state participation in the global rendition system was far from uniform and involved countries participating in a varying number of ways. Figure 4 display two examples of new rendition flight circuits identified by the matching model which pass through Norway (red circuit) and Kazakhstan (blue circuit). During mid-September

2005, flight data relating to the Norway circuit records a previously used rendition aircraft, with the tail number N248AB, flying from Miami, U.S. to one of the CIA's most famous detention sites located in Guantánamo Bay. The aircraft is then observed flying to a frequently used staging post in Shannon, Ireland, before landing in Kabul, Afghanistan where a number of confirmed CIA secret prisons were located. The next



**Figure 4.** Example of new rendition circuits.

day, the aircraft is then observed flying straight to Bergen, Norway before heading back to Washington, DC, U.S.. On the other hand, flight data related to the Kazakhstan circuit documents the same previously used rendition aircraft, with the tail number N248AB, completing a return flight from Teterboro, NJ., U.S. to Toronto, Canada

before departing from Washington, U.S. during mid-October 2003 and flying to the same staging post based in Shannon, Ireland. The aircraft is then recorded as landing in Baghdad, Iraq and finally Almaty, Kazakhstan.

The identification of 15 new countries potentially involved in this secret rendition network, could have important implications for the concerned states if it is proven that they knowingly participated in or condoned rendition.<sup>7</sup> While the secret nature of counterterrorism cooperation imposes serious constraints on being able to externally validate these key findings with high degrees of certainty, triangulating new results with reliable qualitative evidence is a crucial step. I shall demonstrate this point by presenting two examples of how novel results from the data can be cross-verified with findings from a robust selection of sources. For example, while there have been no formal allegations made against Qatar, a substantial body of qualitative reports allege that a CIA secret detention site was located in the country. As a key participant in Operating Enduring Freedom, Qatar is known to have offered the U.S. and its allies use of the Al Udeid Airbase – where detainees were reportedly imprisoned in secret and interrogated (Mayer 2005).

On the other hand, despite public opposition to the Iraq War in 2003, a number of news sources have revealed that the U.S. and France regularly cooperated in secret during the global war on terror. This included the establishment of a covert intelligence

center in 2002 in Paris that tracked the movement of terrorist suspects and organized operations to capture them (Priest 2005). In addition, a criminal investigation was opened in 2005 following a complaint that two aircrafts had landed in France suspected of transporting CIA prisoners. The investigation concluded with the French Minister of Foreign Affairs explaining that they could not exclude the possibility that CIA flights had landed on French soil (ECCHR 2009). France was also one of thirteen governments who maintained administrative silence during an investigation that used the right of access to enquire about the landing of flights associated with extraordinary rendition (Reprieve and Access Info 2011).<sup>8</sup> This brief exercise demonstrates the valuable contribution that this article makes towards our understanding of international cooperation in extraordinary rendition and secret detention beyond the known 54 cases, when its inferences are coupled with credible qualitative evidence.

### **Model evaluation**

To estimate the accuracy of the predictive model I conduct a series of robustness checks, including Repeated Cross Validation. This evaluates the predictive capability of the model trained on one set of data, using a machine-learning algorithm that randomly splits the data into k-folds and measures accuracy of the model by the mean over the samples (Kohavi, 1995). Table 4 displays the results of a Naïve Bayes analysis of the predicted conditional probability of previously confirmed rendition flights in the

original Rendition Project Database using this model (model 1). Moreover, I also consider conditional probability given by the model for previously confirmed non-rendition flights that we are certain were not used by the CIA for rendition purposes (model 2). This includes 90 flights within the original Rendition Project Database that have been investigated and tagged as “not suspicious” (Blakeley and Raphael, 2013c).

**Table 4.** Estimating model accuracy with 10x repeated k-fold cross validation using Naïve Bayes.

<b>Model 1 (Confirmed Rendition Flights)</b>		
Kernel Density Distribution	Accuracy	Accuracy (S.D.)
FALSE	0.970	0.004
TRUE	0.994	0.000
<b>Model 2 (Confirmed Rendition Flights)</b>		
Kernel Density Distribution	Accuracy	Accuracy (S.D.)
FALSE	ZV	ZV
TRUE	0.992	3.441

Zero Variation (ZV) is present in Model 2 when a Kernel Density Distribution is not employed since the model correctly predicts 100% or all the confirmed non-rendition flights.

The model is trained using 10 folds of the training data and repeated 10 times; computing model accuracy based on the test data not used for training. The results indicate a model accuracy between 97%-99%. As can be seen in Table 4, Model 2 correctly predicts 100% or all the confirmed non-rendition flights with zero variability, making it impossible to perform a Naïve Bayes analysis using cross-validation without employing a Kernel Density Distribution.

## **Conclusion**

How many countries participated in rendition and secret detention during the post-9/11 period – and to what extent? The clandestine nature of counterterrorism cooperation makes it difficult to study this directly, and previous research on rendition has been plagued by uncertainty and a lack systematic data and empirical evidence. This article provides a unique contribution to a wider discussion within the field of political science that considers how to deal with the issues involved in measuring partially observable processes such as repression and human rights violations (Brysk, 1994; Fariss, 2014; Dancy and Fariss, forthcoming). I seek to overcome these common challenges by creating a predictive model to identify international cooperation in extraordinary rendition. Despite its secret nature, potential international cooperation in rendition can be measured using publicly available flight data and information on flight characteristics. This provides an ideal opportunity to expand our understanding of international cooperation in sensitive areas of international politics and empirically test relevant theoretical arguments. In addition to the 61 previously identified rendition flights and 130 individuals confirmed to be subjected to CIA detention and interrogation during the post-9/11 period (Stafford Smith, 2008; Hooper, 2009; Blakely and Raphael, 2013), there are likely to be many more detainees possibly unaccounted for. My analysis identifies 307 new likely rendition flights and 15 previously unidentified

countries potentially involved. This provides a new and improved rendition indicator that can be used to scientifically evaluate international security and foreign policy issues, as well as a template for how challenging international politics and human rights events can be studied using insight from matching data mining analyses.

### Notes

<sup>1</sup> Afghanistan, Albania, Algeria, Australia, Austria, Azerbaijan, Belgium, Bosnia-Herzegovina, Canada, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Egypt, Ethiopia, Finland, Gambia Georgia, Germany, Greece, Hong Kong, Iceland, Indonesia, Iran, Ireland, Italy, Jordan, Kenya, Libya, Lithuania, Macedonia, Malawi, Malaysia, Mauritania, Morocco, Pakistan, Poland, Portugal, Romania, Saudi Arabia, Somalia, South Africa, Spain, Sri Lanka, Sweden, Syria, Thailand, Turkey, United Arab Emirates, United Kingdom, Uzbekistan, Yemen and Zimbabwe (Open Society Foundations, 2013).

<sup>2</sup> A flight circuit captures the aircraft's journey from start to finish and is made up of several individual flights where each leg represents a single flight from a departure airport to an arrival airport. Flights are considered part of the same flight circuit that took place on the same aircraft, on the same day ( $\pm 1$  day).

<sup>3</sup> This group of flights necessarily includes detainee renditions that have been at the center of a major intergovernmental investigation into rendition or high profile legal case linking the aircraft to a confirmed detainee transfer (European Parliament, 2006; Council of Europe, 2008; American Civil Liberties Union, 2007; United Nations, 2010; Redress, 2014).

<sup>4</sup> Specifically, I use matching as a data pre-processing procedure. Unlike many studies that use matching as a pre-processing procedure for causal inference to ensure balancing on the observed covariates, I use it to set specific criteria to identify flights that have the same characteristics as known rendition flights. Although matching could potentially produce the same information as a truth table, it also provides valuable additional information such as the likelihood that each flight will meet these conditions. For instance, since the values of all the covariates are binary, this process produces five categories with varying degrees of similarity from subgroup 1 (most similar) to subgroup 5 (least similar). The procedure can also be easily used for replication.

<sup>5</sup> While these flights shall not be taken into consideration, it is entirely possible that aircrafts may not have had a chance to return to their home bases between rendition operations or that rendition teams allegedly based in Washington Dulles International were already stationed in the field (Reprieve, 2012).

<sup>6</sup> Accordingly, many of these flights include journeys directly from Washington Dulles International Airport to a secret detention sites such as Guantánamo Bay. One can consider many security reasons as to why private civilian aircraft may have been contracted to such destinations aside from detainee transfers – including the sending of CIA interrogators to secret detention facilities.

<sup>7</sup> Brazil, Dominican Republic, France, Jamaica, Japan, Kazakhstan, Kuwait, Malta, Norway, Qatar, Senegal, Seychelles, South Korea, Tajikistan, Tunisia (see Appendix 4).

<sup>8</sup> The majority of these countries are known to have been involved in extraordinary rendition and secret detention; Albania, Austria, Azerbaijan, Cape Verde, Georgia, France, Iceland, Italy, Latvia, Romania, Russia, Spain, Turkey (Open Society Foundations 2013).

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**Appendix 1. New flight data variables.**

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<b>Variable</b>	<b>Description</b>
Flight ID:	Unique Flight ID
Flight Reg:	Aircraft Registration Number
Year:	Year that the flight took place
Date:	Date of flight
Date Max:	Only circuit start and end dates are given
Dep Time:	Flight departure time
Arr Time:	Flight arrival time
Dep ICAO:	Intl Civil Aviation Organization code for departure airport
Arr ICAO:	Intl Civil Aviation Organization code for departure airport
Dep Country:	Country that the flight departs from
Arr Country:	Country that the flight arrives in
Dep City:	City that the flight departs from
Arr City:	City that the flight arrives in
Dep Airport:	Airport that the flight departs from
Arr Airport:	Airport that the flight arrives in
Circuit ID:	Unique Circuit ID
Circuit Code:	Unique Circuit ID (flight reg-circuit start-circuit end)
Circuit Cont:	Flight directly continues from previous flight (dummy variable)
Circuit Total:	Total number of flights in the circuit
Circuit Start:	Start date of the circuit
Circuit End:	End date of the circuit
Parallel Flight*:	Inconsistencies in flight data
Circuit Category*:	Classification of rendition circuit
Circuit Notes*:	Additional comments on flight
Flight Notes*:	Additional comments on circuit
Detainees*:	Detainees suspected to be on board flight
Companies*:	Corporations suspected to be involved in flight
Source*:	Source where the flight data originates
Detention Site: (dummy variable)	Flight lands in close proximity to a secret detention site

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**Appendix 1. (Continued)**

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<b>Variable</b>	<b>Description</b>
Staging Actual: (dummy variable)	Flight lands at a frequently used staging post for renditions
Staging Post: (dummy variable)	Circuit contains flight that lands at a frequently used staging post
Rendition Aircraft: (dummy variable)	Aircraft previously used for rendition purposes
Washington Actual: (dummy variable)	Flight lands at Washington Dulles International Airport
Washington Dulles: (dummy variable)	Circuit contains flight that lands at Washington Dulles
Known Rendition: (dummy variable)	Flight identified by Blakeley & Raphael (2013c) as a rendition
Non Rendition: (dummy variable)	Flight identified by Blakeley & Raphael (2013c) as non-rendition
Rendition Flight: (dummy variable)	Flight identified by my analysis as a rendition
Rendition Circuit: (dummy variable)	Circuit contains a flight identified by my analysis as a rendition

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\* Variable constructed by Blakeley and Raphael (2013c).

**Appendix 2. Rendition flight specification model covariate content.**

<b>Secret detention site</b>			
<b>ICAO code</b>	<b>Airport</b>	<b>City</b>	<b>Country</b>
OAKB	Kabul Intl	Kabul	Afghanistan
OAIX	Bagram AFB	Bagram	Afghanistan
OAKN	Kandahar	Kandahar	Afghanistan
LQSA	Sarajevo	Butmir	Bosnia and Herzegovina
LQTZ	Tuzla	Tulza	Bosnia and Herzegovina
MUGM	Guantanamo Bay Ns	Guantanamo	Cuba
HDAM	Ambouli Intl Airport	Djibouti	Djibouti
HECA	Cairo Intl	Cairo	Egypt
HAAB	Bole Intl	Addis Ababa	Ethiopia
GBYD	Banjul Intl	Banjul	Gambia
ORBI/ORBS	Baghdad Intl Airport	Baghdad	Iraq
OJAI/OJAM	Queen Alia Intl/Marka Intl	Amman	Jordan
HKJK	Jomo Kenyatta International	Nairobi	Kenya
HLLT/HLLM	Tripoli Intl/Mitiga Airport	Tripoli	Libya
EYVI	Vilnius Intl	Vilnius	Lithuania
GMME	Sale	Rabat	Morocco
OPRN	Chaklala	Islamabad	Pakistan
OPKC	Jinnah Intl	Karachi	Pakistan
EPSY	Olsztyn-Mazury Airport	Szymany	Poland
LRBS/LROP	Aurel Vlaicu/Henri Coanda	Bucharest	Romania
VTBD	Don Muang Intl	Bangkok	Thailand
UTTT	Yuzhny	Tashkent	Uzbekistan
OYSN	Sanaa Intl	Sana'a	Yemen
<b>Staging post</b>			
<b>ICAO code</b>	<b>Airport</b>	<b>City</b>	<b>Country</b>
UBBB	Heydar Aliyev	Baku	Azerbaijan
LCLK	Larnaca	Larnaca	Cyprus
LKKV/LKPR	Karlovy Vary/Ruzyne	Prague	Czech Republic
EDDF	Frankfurt Main	Frankfurt	Germany
ETAR	Ramstein Ab	Ramstein	Germany
LGAV	Eleftherios Venizelos Intl	Athens	Greece

**Appendix 2. (Continued)**

<b>ICAO code</b>	<b>Airport</b>	<b>City</b>	<b>Country</b>
BIKF	Keflavik Intl Airport	Keflavik	Iceland
EINN	Shannon	Shannon	Ireland
LIRA	Ciampino	Rome	Italy
RJBB	Kansai	Osaka	Japan
EPWA	Okecie	Warsaw	Poland
LPAZ	Santa Maria	Santa Maria	Portugal
LPPR	Porto	Porto	Portugal
LRTR	Traian Vuia	Timisoara	Romania
FSIA	Seychelles Intl	Mahe	Seychelles
LEPA	Son Sant Joan	Palma de Mallorca	Spain
LTAG	Kaltag Airport	Adana-Incirlik	Turkey
EGPK	Prestwick	Prestwick	UK
FJDG	Diego Garcia Nsf	Diego Garcia	UK
EGGW	Luton	Luton	UK
OMDB	Dubai Intl	Dubai	United Arab Emirates
OMDM	Minhad HB	Minhad HB	United Arab Emirates

**Rendition aircraft**

<b>Aircraft reg.</b>	<b>Aircraft type</b>	<b>Companies</b>
N1HC	Gulfstream IV	United States Aviation Company, Air Routing Intl
N248AB	Gulfstream IV	Gulfstream Acquisitions, Prime Jet
N288KA	Gulfstream III	Air Castle, Kookabura Air, Worldwide Jet Charter
N308AB	Gulfstream IV	Prime Jet, Baseops International, International Trip Planning Services
N313P	Boeing 737	Keeler and Tate Management, Premier Executive Transport Services, Stevens Express Leasing Inc, Aerocontractors, Jeppesen Dataplan



**Appendix 2.** (Continued)

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<b>Aircraft reg.</b>	<b>Aircraft type</b>	<b>Companies</b>
N614RD	Gulfstream IV	International Group, Universal Weather and Aviation
N63MU	Gulfstream IV	Airborne/First Flight, International Groip, Baseops International, Universal Weather and Aviation
N724CL	Boeing 727	Classic Limited Air/Clay Lacy Aviation, Universal Weather and Aviation
N787WH	Boeing 737	Southern Aircraft Services Inc, United States Aviation Company, Victory Air Transport, Baseops International
N829MG	Gulfstream III	Presidential Aviation International, Universal Weather Aviation
N85VM	Gulfstream IV	Assembly Point, Richmor Aviation, Air Routing International
N982RK	Gulfstream III	Richmor Aviation, Air Routing International

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**Washington Dulles International Airport**

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<b>ICAO code</b>	<b>Airport</b>	<b>City</b>	<b>Country</b>
KIAD	Washington Dulles	Washington	United States

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Source: European Parliament, 2006; American Civil Liberties Union, 2007; Council of Europe, 2008; UN, 2010; Blakeley and Raphael, 2013d; Open Society, 2013; Redress, 2014.

### Appendix 3. Country list of rendition flights.

<b>Country</b>	<b>Frequency</b>	<b>Year (min)</b>	<b>Year (max)</b>
Afghanistan	96	2002	2005
Albania	2	2004	2004
Algeria	3	2003	2004
Azerbaijan	4	2003	2004
Bosnia and Herzegovina	4	2003	2004
British Indian Ocean Territory (U.K.)	3	2002	2004
Cuba	27	2002	2005
Cyprus	18	2002	2004
Czech Republic	14	2003	2004
Djibouti	11	2003	2004
Dominican Republic	1	2004	2004
Egypt	47	2001	2004
Ethiopia	1	2005	2005
France	1	2005	2005
Gambia	2	2002	2002
Georgia	1	2002	2002
Germany	64	2001	2004
Greece	6	2001	2002
Indonesia	1	2002	2002
Iraq	28	2003	2005
Ireland	21	2002	2005
Italy	6	2002	2004
Japan	2	2002	2003
Jordan	65	2001	2005
Kazakhstan	1	2003	2003
Kenya	4	2003	2003
Kuwait	1	2003	2003
Libya	22	2003	2005
Malta	1	2004	2004
Morocco	37	2002	2004
Norway	1	2005	2005
Pakistan	17	2001	2004

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**Appendix 3. (Continued)**

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<b>Country</b>	<b>Frequency</b>	<b>Year (min)</b>	<b>Year (max)</b>
Poland	20	2002	2003
Portugal	21	2002	2005
Romania	8	2003	2004
Senegal	1	2003	2003
Seychelles	2	2004	2004
South Korea	1	2003	2003
Spain	16	2004	2005
Sri Lanka	3	2003	2003
Thailand	6	2002	2004
Tunisia	2	2004	2004
Turkey	3	2002	2003
Turks and Caicos Islands (U.K.)	6	2002	2004
United Arab Emirates	15	2002	2004
United Kingdom	28	2001	2005
United States	26	2001	2005
Uzbekistan	28	2001	2003

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**Appendix 4.** Country list of rendition circuits.

<b>Country</b>	<b>Frequency</b>	<b>Year (min)</b>	<b>Year (max)</b>
Afghanistan	96	2002	2005
Albania	2	2004	2004
Algeria	8	2001	2004
Austria	2	2002	2002
Azerbaijan	11	2002	2004
Bosnia and Herzegovina	4	2003	2004
Brazil*	3	2004	2004
British Indian Ocean (U.K.)	4	2002	2004
Canada	11	2002	2004
Cuba	27	2002	2005
Cyprus	39	2002	2004
Czech Republic	35	2003	2004
Djibouti	11	2003	2004
Dominican Republic*	1	2004	2004
Egypt	50	2001	2004
Ethiopia	1	2005	2005
France*	3	2004	2005
Gambia	2	2002	2002
Georgia	2	2002	2002
Germany	141	2001	2004
Greece	12	2001	2002
Hong Kong	1	2003	2003
Iceland	6	2004	2004
Indonesia	2	2002	2002
Iraq	28	2003	2005
Ireland	91	2001	2005
Italy	13	2002	2005
Jamaica*	1	2004	2004
Japan*	6	2002	2003
Jordan	66	2001	2005
Kazakhstan*	1	2003	2003
Kenya	4	2003	2003
Kuwait*	3	2003	2003

**Appendix 4. (Continued)**

<b>Country</b>	<b>Frequency</b>	<b>Year (min)</b>	<b>Year (max)</b>
Libya	22	2003	2005
Malta*	3	2004	2005
Morocco	37	2002	2004
Norway*	2	2005	2005
Pakistan	18	2001	2004
Poland	24	2002	2003
Portugal	43	2002	2005
Qatar*	1	2003	2003
Romania	11	2003	2004
Senegal*	2	2003	2003
Seychelles*	2	2004	2004
South Korea*	2	2003	2003
Spain	35	2001	2005
Sri Lanka	4	2003	2003
Sweden	2	2001	2001
Tajikistan*	3	2001	2004
Thailand	8	2002	2004
Tunisia*	2	2004	2004
Turkey	11	2002	2005
Turks and Caicos Islands (U.K.)	9	2002	2004
United Arab Emirates	23	2002	2004
United Kingdom	86	2001	2005
United States	470	2001	2005
Uzbekistan	28	2001	2003
Yemen	3	2001	2001

\* 15 new participating countries beyond the 54 known cases (Open Society Foundations, 2013).