

## Documento de TC

### I. Información básica

▪ País/Región:	Países Andinos (Colombia, Perú, Ecuador)
▪ Nombre de la CT:	Desarrollo de Seguros Climáticos en Países Andinos.
▪ Número de CT:	RG-T2447
▪ Jefe de Equipo/Miembros:	Sergio Ardila (INE/RND), Jefe de Equipo. Fernando Balcazar (RND/CCO); Eirivelthon Lima (RND/CPE); Marisol Inurritegui (/RND/CEC); Escarlata Baza (LEG/SGO); y Elizabeth Chávez (INE/RND).
▪ Indicar si es: Apoyo Operativo, Apoyo al Cliente, o Investigación y Difusión	Apoyo al Cliente (CS)
▪ Si es Apoyo Operativo, proveer número y nombre de la operación que apoyará la CT:	N/A
▪ Fecha del Abstracto de CT:	Abril 28, 2014
▪ Beneficiario (países o entidades que recibirán la asistencia técnica):	Regional - Colombia, Perú y Ecuador
▪ Agencia Ejecutora y nombre de contacto (organización o entidad responsable de la ejecución del programa de CT)	BID, a través de la División de Medio Ambiente, Desarrollo Rural y Administración de Riesgos por Desastres (INE/RND)
▪ Donantes que proveerán financiamiento:	Fondo de Prevención de Desastres (FDP)
▪ Financiamiento Solicitado del BID:	US\$500.000
▪ Contrapartida Local, si hay:	US\$700.000
▪ Periodo de Desembolso (incluye periodo de ejecución):	30 meses
▪ Fecha de Inicio requerido:	Octubre 2014
▪ Tipos de consultores (firmas o consultores individuales):	Consultores Individuales y Firmas
▪ Unidad de Preparación:	INE/RND
▪ Unidad Responsable de Desembolso:	INE/RND
▪ CT incluida en la Estrategia de País:	No
▪ CT incluida en CPD (s/n):	No
▪ Sector Prioritario GCI-9:	Protección del medio ambiente y cambio climático

### II. Objetivo y justificación de la CT

- 2.1 El objetivo de la CT es avanzar en la adopción de Seguros Indexados al Clima (SIC) en la región andina mediante la estimación ex ante del impacto económico de su adopción, la identificación de los principales factores que influyen en la factibilidad de utilizar estos seguros, y la estimación rigurosa del impacto económico de la utilización de SIC para una aplicación específica de este instrumento. Los seguros se

usan en agricultura para otorgar protección a los productores contra pérdidas causadas por riesgos climáticos y deastres naturales. La cooperación técnica se enfocará en los principales cultivos y regiones agrícolas de los países andinos, con énfasis especial en Colombia, Ecuador y Perú, si bien la aplicación que será evaluada (seguro para productores cafeteros) se ubica en Colombia.

- 2.2 La administración del riesgo climático y de desastres naturales en el sector agrícola ha sido tradicionalmente una tarea compleja, especialmente en países en desarrollo, la cual se hace más difícil ante los efectos previsibles del cambio climático. Los fenómenos climáticos cubren generalmente amplias zonas afectando comunidades o regiones enteras. Esta característica genera una elevada correlación geográfica de las pérdidas, limitando la utilización de mecanismos tradicionales de seguros usados por pequeños agricultores (préstamos de miembros de la comunidad, venta de animales), y aún la capacidad de empresas de seguros para atender al sector rural si no están suficientemente diversificadas o cuentan con reaseguro efectivo.
- 2.3 Los seguros agrícolas tienen un largo historial en algunos países de Latino América. Desde los años 50s hasta finales de los 80s, los programas fueron ofertados principalmente por el sector público y usualmente eran ligados a programa de crédito para pequeños agricultores. A pesar de la gran acogida, la mayoría de estos programas tuvieron un desempeño muy deficiente, con altos costos de operación y altas pérdidas, exacerbadas por las bajas primas y pésima administración. Para finales de la década de los 80 la mayoría de los programas fueron cancelados. Desde los 90s los gobiernos han promovido seguros agrícolas a través de compañías privadas, los cuales generalmente están respaldados con fondos gubernamentales. Actualmente 18 de los 25 países con base agrícola significativa en la región poseen algún tipo de programa de seguros agrícola; sin embargo, las primas representaron tan solo el 0.37% del PIB agrícola en Latino América en el 2009, en comparación con 6% promedio en Canadá y USA. Latino América representó el 4% del total de contratos de seguros agrícolas firmados a nivel mundial en el 2010 (Mahul and Stuley, 2010), la mayoría concentrados en Argentina, Brasil y México (85% del total); Chile, Uruguay y Paraguay (10%) y los países Andinos (3%).
- 2.4 En los últimos años han emergido los Seguros Indexados al Clima (SIC), en los cuales los pagos de indemnización están ligados a un índice objetivo (por ejemplo el nivel de precipitación acumulada durante el periodo de siembra) y no a una evaluación de los daños, como es el caso de los instrumentos tradicionales. Los SIC tienen propiedades muy interesantes pues reducen los dos problemas clásicos de los seguros tradicionales: (i) selección adversa, la cual se da por la asimetría de información entre las compañías de seguro y los agricultores, que resulta en que sean los agricultores “más riesgosos” los que compran el seguro, sin que las compañías puedan diferenciarlos efectivamente, y por tanto las primas de seguro son iguales para los dos grupos desincentivando su uso; y (ii) riesgo moral, el cual se presenta cuando los compradores de seguro no toman todas las previsiones deseables para evitar los daños, comportamiento que no puede ser monitoreado efectivamente, lo cual exige que las pérdidas deban ser compartidas entre agricultores y empresas reduciendo su impacto. Adicionalmente, los SIC tienen bajos costos administrativos pues eliminan

la necesidad de hacer una evaluación de las pérdidas, ya que los pagos se hacen en función del comportamiento del índice acordado.

- 2.5 Aunque los SIC piloto han tenido éxito, la demanda ha sido generalmente más baja de lo esperado, y se requiere entender mejor el comportamiento de los agricultores ante este tipo de instrumentos, e identificar las formas contractuales y mecanismos de incentivo costo-eficiente que pueden aumentar su utilización, dado su gran beneficio potencial.
- 2.6 Esta CT es consistente con las metas del programa de financiamiento establecidas por el Noveno Aumento General de Recursos del Banco ([BID-9](#)), y contribuirá al aumento en el número de agricultores que tienen acceso a servicios mejorados. Así mismo es consistente con la política de prevención de desastres naturales y con el Marco Sectorial de Agricultura<sup>1</sup>, el cual identifica los riesgos climáticos en la región andina como uno de los factores que afectan el desarrollo del sector en estos países, e igualmente indica la importancia de apoyar la gestión del riesgo en el sector agrícola.

### **III. Descripción de las actividades/componentes y presupuesto**

#### **3.2 Componente I. Evaluación económica ex ante de los beneficios de introducir seguros indexados al clima.** Este componente contempla dos fases:

- a. La primera fase tiene como objetivo comprobar que existen las condiciones cuantitativas (i.e. información) y cualitativas (arreglos institucionales) necesarias para el adecuado desarrollo de los SIC. Consta de cuatro actividades que serán realizadas con base en información a recopilar en los países: (i) Determinar el rol del riesgo climático en las regiones bajo estudio; (ii) Definir el conjunto de productos agrícolas en cada país sobre los cuales se evaluará prioritariamente la factibilidad de los seguros indexados; (iii) Evaluar la calidad de la información climatológica y agronómica disponible; y (iv) Evaluar aspectos institucionales requeridos para la implementación de los seguros indexados. Este componente cubrirá los tres países. En el caso de Colombia se concentrará en productos diferentes al café, para el cual ya se está montando un contrato de seguro con una empresa privada, el cual será evaluado con esta CT como se indica más adelante.
- b. En la segunda fase se diseñarán contratos prototipo de SIC para cultivos/zonas seleccionados en los tres países en el componente anterior, para manejar los riesgos climáticos definidos. El proceso de diseño de los productos SIC requiere: (i) la creación/estimación de un índice cuya variación este altamente correlacionada con las pérdidas agrícolas por eventos climáticos para los cultivos seleccionados; (ii) diseñar un contrato que especifique las primas para niveles dados de cobertura de un evento climático definido, y los montos de indemnización que ofrecerá el seguro; y (iii) estimación del beneficio económico ex-ante para productores y para la sociedad en su conjunto.

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<sup>1</sup> Ver Marco Sectorial, párrafo 5.6, ítem c.

**3.3 Componente II. Análisis de la demanda potencial y factores clave que la afectan.**

En este componente se contratará una consultoría especializada para que usando técnicas de economía experimental y economía del comportamiento (*Behavioral Economics*) analice de una manera controlada diferentes factores que afectan el comportamiento de los agricultores al tomar decisiones sobre manejo/cobertura de riesgos, con el propósito de derivar lecciones para mejorar el diseño de los contratos y evaluar de una mejor manera su aceptabilidad. Se implementarán sesiones de “juegos experimentales” con una muestra de productores seleccionados, y los trabajos se realizarán en Colombia, si bien se espera que los resultados puedan ser extrapolables a otros países de la zona andina y en general a zonas en las cuales predominan la pequeña y mediana agricultura. La primera parte de estos trabajos estará dedicada a “juegos contextualizados” (*framed games*) utilizando los parámetros de los contratos modelo para evaluar las preferencias relativas para contratos alternativos. Adicionalmente, se diseñarán juegos que permiten una exploración profunda sobre varios factores claves de demanda sugeridos por la teoría microeconómica incluyendo: heterogeneidad de las percepciones subjetivas del riesgo; efectos de puntos de referencia y contextualización (*reference and framing effects*); y aversión a la ambigüedad (*ambiguity aversion*).

**3.4** Al finalizar esta parte de los trabajos se tendrán los siguientes productos: (i) estimación de las creencias subjetivas de las funciones de probabilidades de los índices comúnmente utilizados en los SICs; (ii) análisis de la heterogeneidad de las creencias subjetivas y evaluación del sesgo relativo de las creencias subjetivas de los índices alternativos; (iii) estimación de la demanda de cada una de los productos ofrecidos por parte de los agricultores; (iv) análisis de las preferencias relativas al riesgo para los agricultores de las regiones seleccionadas; (v) estimación de los parámetros asociados con la Teoría de Posibilidades Acumulativas (*Cumulative Prospect Theory*) y la aversión a la ambigüedad; (vi) evaluación del desempeño relativo de las teorías alternativas de toma de decisión de frente al riesgo y la incertidumbre y análisis de las implicancias de esta evaluación para el diseño de los contratos de SIC; (vii) análisis ex ante del impacto de la demanda de seguros sobre la implementación de nuevas tecnologías de producción; y (viii) análisis ex ante del impacto de la demanda de seguros sobre la demanda de préstamos a cooperativas rurales.

**3.5 Componente III. Evaluación del piloto del seguro cafetero en Colombia.** Las autoridades del Ministerio de Agricultura en Colombia han venido impulsado la adopción de instrumentos de seguros en el país, y en ese contexto se hizo una licitación en 2013 para obtener propuestas de empresas aseguradoras para un contrato de seguros indexado al clima que cubriría riesgos climáticos a los cultivadores de café. La propuesta ganadora ha sido evaluada y se han propuesto ajustes a la forma del contrato pues cubría eventos de muy baja probabilidad de ocurrencia y además subsistía un riesgo base elevado para los agricultores por la falta de una buena correlación estadística entre el índice de lluvia propuesto y las pérdidas experimentadas en un porcentaje significativo de las fincas cafeteras. Los elementos básicos de las propuestas de ajuste han sido negociados entre el Ministerio de Agricultura, la Federación de Cafeteros y la empresa ganadora, y se ha acordado

hacer un lanzamiento piloto del seguro que cubriría unas 50.000 hectáreas en todo el país. El contrato a ofrecer se beneficiará además de los resultados de los juegos experimentales que se realizarán en la Componente III de esta Cooperación Técnica. El costo de la prima del seguro será subsidiado en un 70% utilizando recursos del Ministerio de Agricultura, y el costo remanente será asumido por los agricultores.

3.6 Este Componente tiene entonces como objetivo evaluar el impacto del seguro cafetero en Colombia para responder tres preguntas claves:

- a. Cuál es la elasticidad de demanda por el seguro indexado por parte de los pequeños cafeteros;
- b. Cuál es el impacto del seguro indexado en:
  - La inversión (valor de insumos y mano de obra por hectárea),
  - La adopción de técnicas y prácticas mejoradas (poda, etc.),
  - El rendimiento y el ingreso neto,
  - El acceso a crédito y la demanda por crédito;
- c. Cuál es la importancia de las redes sociales y productivas en la adopción del seguro.

3.7 Para identificar el impacto del seguro se necesita generar una variación exógena en el uso del seguro, y para ello se utilizarán dos estrategias:

- a. *Randomized roll-out*: El eje cafetero en Colombia cuenta con más de 500 municipios con una alta concentración de café. Durante el periodo del piloto, se seleccionarán al azar tres grupos de municipios para la investigación:
  - 20 municipios donde se introducirá el seguro en 2014;
  - 20 municipios donde se introducirá el seguro en 2015 (actuarán como control en 2014, y tratamiento en 2015);
  - 20 municipios donde se introducirá el seguro en 2016 (actuarán como control en 2014 y 2015).
- b. *Randomized Encouragement design*: En los municipios donde se introduce el seguro, se ofrecerán “cupones” que dan un descuento a la prima. Los cupones tendrán 3 niveles: 25%, 50%, 75% de descuento. Se escogerán al azar los beneficiarios de los cupones y de esa forma se obtendrán dos objetivos: (i) Aumentar el “uptake” del seguro en los municipios de tratamiento y, como resultado, aumentar la precisión de la estimación del impacto; y (ii) Permitir, a través de la variación exógena en precio, la estimación de la elasticidad de demanda por el seguro.

3.8 Dentro de cada municipio se seleccionarán cafeteros para la muestra, para un total de 1.000 hogares que se dividirán en tres grupos según el año de introducción. A cada hogar de la muestra se le aplicará dos encuestas (2014 como año base, y 2016). Los costos principales del piloto y su evaluación se originan en: (i) el costo del subsidio a la prima (estimado en US\$14/hectárea-agricultor para un total de 50.000 agricultores, que será cubierto por el Ministerio de Agricultura); y (ii) el costo de las encuestas

(1.000 encuestas, dos veces, con un costo unitario de US\$65/encuesta); a los cuales se debe agregar el costo de los cupones y de los servicios de consultoría.

#### Matriz de resultados Indicativa

<b>Objetivo de la CT</b>	El objetivo de la CT avanzar en la adopción de SIC en la región andina mediante la estimación ex ante del impacto económico de su adopción, la identificación de los principales factores que influyen en la factibilidad de utilizar estos seguros, y la estimación rigurosa del impacto económico de la utilización de SIC para una aplicación específica de este instrumento.		
<b>Indicadores de Impacto ExPost</b>	<b>Línea de Base</b>	<b>Meta (2020)</b>	<b>Observaciones</b>
Programas de SIC puesto en ejecución cubriendo al menos el 25% del área de al menos uno de los cultivos principales identificados en cada país.	0	3 programas (uno por país) de SIC puestos en ejecución.	El cumplimiento de esta meta tomará tiempo pues se requiere el establecimiento de acuerdos/contratos entre las autoridades de los Ministerios de Agricultura y del área económica y las compañías aseguradoras con especialidad en temas agrícolas.
<b>Indicadores de Resultados (outcomes)</b>	<b>Línea de Base</b>	<b>Final del Programa (2017)</b>	<b>Observaciones</b>
Número de países Andinos en los cuales se incluye el manejo de riesgos en agricultura en los documentos de país o de estrategia	0	3	
Resultados de la Evaluación Económica de la utilización de SIC para los principales cultivos difundidos en un seminario a las autoridades de los Ministerios de Agricultura y de las autoridades económicas	0	3 seminarios realizados	
Propuesta específicas de ajuste a los contratos típicos de seguros agrícolas desarrolladas para el caso de SIC con base en resultados de los juegos experimentales desarrolladas.	0	Documento con propuestas específicas de ajuste a los contratos de seguros agrícolas.	La identificación de estos factores proveerá información que ayudará en el diseño de los contratos de seguro, mejorando la adopción de este instrumento
Difusión en un taller internacional en Colombia sobre los resultados impactos de la adopción del SIC cafetero en: (i) La inversión (valor de insumos y mano de obra por hectárea), (ii) La adopción de técnicas y prácticas mejoradas (poda, etc.), (iii) El rendimiento y el ingreso	0	Taller internacional realizado con participación de autoridades de Ministerios de Agricultura y del área económica de los 3 países.	Los resultados de esta CT proveerán la primera estimación rigurosa de la adopción de un SIC en países andinos.

neto, (iv) El acceso a crédito y la demanda por crédito			
<b>Resultados (Outputs)</b>	<b>Indicador</b>	<b>Línea de Base (2014)</b>	<b>Meta (2017)</b>
<b>Componente I: Evaluación Económica ex ante de la adopción de SIC en países Andinos</b>			
Productos: un informe por país (Colombia, Ecuador, Perú), identificando los cultivos y beneficios económicos que se podrían obtener con la adopción de SIC.	Reporte para cada país, con los resultados de la evaluación económica ex ante de la adopción de SIC en los principales cultivos agrícolas	0	3
<b>Componente II: Análisis de la demanda potencial y factores que la afectan</b>			
Producto: Informe con resultado de los “juegos experimentales”	1 reporte con los resultados de los juegos experimentales y recomendaciones para el diseño de los contratos de SIC	0	1
<b>Componente III: Evaluación de impacto del piloto de SIC para productores cafeteros en Colombia</b>			
Producto: Informe con resultados de la evaluación de impacto del piloto de SIC para productores cafeteros.	1 reporte con los resultados de la evaluación de impacto	0	1

- 3.9 El monto total de la CT es US\$1.200.000 de los cuales US\$500.000 serán financiados por el Fondo de Prevención de Desastres (FDP) de forma no reembolsable y US\$700.000 corresponden a un aporte del Ministerio de Agricultura y Desarrollo Rural de Colombia. El aporte del Ministerio de Agricultura de Colombia cubrirá el subsidio a la prima del seguro que se otorgará a los agricultores que lo adquieran en la realización del programa piloto que se evaluará con esta CT. Las principales actividades y el plan presupuestal para la implementación se describe en la siguiente tabla.

#### Presupuesto Indicativo

<b>Componente</b>	<b>BID (US\$)</b>	<b>Contraparte (US\$)</b>	<b>Total (US\$)</b>
I. Evaluación económica ex ante de los beneficios de introducir SIC	80.000		80.000
II. Demanda potencial y factores clave (Juegos Experimentales) <sup>2</sup>	100.000		100.000
III. Evaluación del Piloto del Seguro Cafetero en Colombia	320.000	700.000	1.020.000
<b>TOTAL</b>	<b>500.000</b>	<b>700.000</b>	<b>1.200.000</b>

<sup>2</sup> Los costos de dos consultorías internacionales se incluyen en el componente III pues los trabajos serán realizados por el mismo equipo de consultores.

#### **IV. Agencia ejecutora y estructura de ejecución**

- 4.1 Esta CT es para apoyar a los países andinos (Apoyo al cliente - CS) para atender un tema de gran importancia en la región y se han recibido solicitudes de apoyo para trabajar en este tema<sup>3</sup> ([ver link](#)). Se acordó con las autoridades de los países que, dado que los estudios se realizarán en los tres países, para agilizar la realización de los estudios la CT será ejecutada por INE/RND, si bien en el desarrollo de los trabajos se requerirá contar con la colaboración de los tres países, los cuales han manifestado su interés de colaborar.
- 4.2 INE/RND contratará los servicios de firmas de consultoría de acuerdo con las políticas para la selección y contratación de consultores financiados por el Banco (documento GN-2350-9). Para la contratación de recursos humanos se aplicaran los procedimientos de Recursos Humanos del Banco establecidos en la norma AM-650 y para servicios distintos de consultoría se seguirán las políticas corporativas (GN-2303-20). Las contrataciones a realizar se presentan en el plan de adquisiciones en el Anexo II. Se prevé contratar en forma directa a la Universidad de los Andes para la ejecución y análisis de los juegos experimentales, dada la experiencia excepcional en esta materia, el reconocimiento académico que tiene la Universidad a nivel nacional e internacional y por la experiencia reconocida de varios de sus investigadores en el tema de Economía Experimental, en el cual han desarrollado numerosos trabajos en diversos campos, en especial en temas rurales. Este es un tema altamente especializado que requiere la utilización de técnicas precisas y el buen uso de las mismas es clave para lograr resultados confiables. El monto estimado de la contratación es de US\$100,000, y su justificación guarda conformidad con las disposiciones establecidas en el apartado 3.10 c) de las Políticas de Adquisiciones GN-2350-9.

#### **V. Riesgos importantes**

- 5.1 El principal riesgo para el desarrollo de la CT es que no exista información climática suficientemente detallada para poder construir los índices, y la información sobre pérdidas asociadas a la intensidad del evento climático. Así mismo, se requiere la existencia de infraestructura institucional: empresas de seguros y organizaciones de productores con interés de trabajar en el tema, y autoridades públicas con capacidades regulatorias apropiadas.

#### **VI. Excepciones a las políticas del Banco**

- 6.1 Ninguna.

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<sup>3</sup> Se recibió solicitud oficial de Colombia, del Ministerio de Agricultura de Ecuador y comunicación informal del Ministerio de Agricultura de Perú. Previo al inicio de actividades en Ecuador y Perú se deberá obtener la no objeción de la Agencia Peruana de Cooperación Internacional y de la Secretaria Técnica de Cooperación Internacional del Ecuador, respectivamente.

## **VII. Salvaguardias Ambientales**

- 7.1 Esta TC ha sido clasificada como categoría “C”, de conformidad con la herramienta de clasificación del Banco; sin ningún impacto social o medioambiental.

Safeguard Policy Filter Report y Safeguard Screening Form Report ([Ver Link](#))

### **Anexos Requeridos:**

- Solicitud del cliente ([Ver Link](#))
- Términos de Referencia ([Ver Link](#))
- Plan de Adquisiciones ([Ver Link](#))



Agencia  
Presidencial  
de Cooperación  
Internacional  
de Colombia

PROSPERIDAD  
PARA TODOS



Al contestar por favor cite estos datos:

Radicado No. 20143000013801

Bogotá. 10-07-2014

Señor

**RAFAEL DE LA CRUZ**

Representante en Colombia

Banco Interamericano de Desarrollo

Bogotá, D.C.

20143130237062

MINISTERIO DE AGRICULTURA Y  
DESARROLLO RURAL

GRUPO DE GESTIÓN DOCUMENTAL

FECHA: 11 JUL 2014

HORA: 11:24 am MTJ

Amos 2 Edios

HL

Asunto: Aval favorable cooperación técnica "Desarrollo de Seguros Climáticos en Países Andinos".

Estimado Señor de la Cruz:

Hemos recibido la iniciativa de la referencia que será financiada con recursos de cooperación técnica no reembolsable del BID y que tiene como objetivo impulsar la utilización del seguro agropecuario.

El proyecto está alineado con la estrategia de Buen Gobierno, las metas del Plan Nacional de Desarrollo "Prosperidad para Todos" y de la Estrategia Nacional de Cooperación Internacional ENCI 2012 – 2014, por lo que, APC-Colombia manifiesta su No Objeción frente al proyecto y adjunta el concepto técnico favorable emitido por el DNP.

Agradecemos mantenemos informados de los avances de esta iniciativa.

Cordial saludo,

**CAROLINA TENORIO GARCÉS**

Directora Gestión de Demanda

Agencia Presidencial de Cooperación Internacional de Colombia

Vc. Bc. Gloria Matilde Ortiz, Coordinadora Grupo Multilaterales

Copia: Hernán Miguel Román Calderón, Viceministro de Asuntos Agropecuarios, Ministerio de Agricultura, Cra 8 12 B-31 Piso 5

Javier Gama, Jefe de Operaciones, BID, Carrera 7 # 71 – 21 Torre B Piso 19

José Mauricio Cuevas Gómez, Director de Inversiones y Finanzas Públicas, DNP, Calle 26 13-19

Andrés Felipe Trejos Medina, Sub Director de Crédito, DNP, Calle 26 13-19

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**Oficio Nro. MAGAP-M.A.G.A.P-2014-0529-OF**

**Quito, D.M., 07 de julio de 2014**

**Asunto:** Estudio de potencialidad de Países Andinos en el Desarrollo de Seguros Climáticos

Señor  
Morgan Doyle  
**Representante del Bid en Ecuador**  
**BID - BANCO INTERAMERICANO DE DESARROLLO**  
En su Despacho

De mi consideración:

En el marco de la consecución de los objetivos del Plan Nacional del Buen Vivir, el Ministerio de Agricultura, Ganadería, Acuicultura y Pesca cuenta con el Proyecto AgroSeguro, para convalidar un sistema permanente de seguridad productiva, subvencionado por el Estado para beneficio de pequeños y medianos productores agrícolas, ganaderos, acuícolas, forestales, pescadores artesanales y otros agentes productivos vinculados al sector de competencia de esta Cartera de Estado.

En ese sentido, me es grato expresar el interés generado por la propuesta extendida por el Banco Interamericano de Desarrollo (BID) para realizar el "Estudio de Potencialidad de Países Andinos en el Desarrollo de Seguros Climáticos", razón por la cual designo al Proyecto AgroSeguro para complementar el trabajo referente al Agro Ecuatoriano.

Atentamente,



**Javier Ponce Cevallos**  
**MINISTRO**



Copia:

Señor Ingeniero  
Mauricio Xavier Gonzalez Mantilla  
**Gerente, Proyecto Agroseguro**

Señorita Licenciada  
Fazzia Lisseth Moreira Izurieta  
**Directora de Preinversión y Cooperación Nacional e Internacional**

Señor Economista  
Carlos Eduardo Noboa Gordón  
**Coordinador General de Planificación**

fm/cn

Rec.  
Original  
08/07/14  
f.

PLAN DE ADQUISICIONES DE COOPERACIONES TECNICAS NO REEMBOLSABLES								
País: Regional								
Número del Proyecto: RG-T2447								
Nº Item	Ref. POA	Descripción de las adquisiciones (1)	Costo estimado de la Adquisición (US\$)	Método de Adquisición (2)	Fuente de Financiamiento y porcentaje		Fecha estimada del Anuncio de Adquisición o del Inicio de la contratación	Comentarios
					BID/MIF %	Local / Otro %		
1		Componente 1: Evaluación Económica Exante de la introducción de SIC						
1.1		Consultor Internacional	47,000	CCIN	100		Octubre 1/2014	
1.2		Consultor Internacional-Senior	33,000	CCIN	100		Octubre 1/2014	
2		Componente 2: Demanda Potencial y Factores Clave (Juegos Experimentales)						
2.1		Ejecución "Juegos experimentales"	100,000	SD	100		Octubre 1/2014	Selección directa de Universidad de los Andes, Colombia (5)
3		Componente 3: Evaluación Impacto SIC cafetero en Colombia						
3.1		Consultor internacional Senior	35,000	CCIN	100		Octubre 1/2014	
3.2		Consultor internacional Senior	30,000	CCIN	100		Octubre 1/2014	
3.3		Análisis ex-ante riesgo base	9,000	CCIN	100		Octubre 1/2014	
3.4		Coordinador de Campo	38,000	CCIN	100		Octubre 15/2014	
3.5		Recolección Información de campo(2 contratos iguales)	176,000		100		Noviembre 15/2014	
3.6		Talleres difusión resultados	32,000	CP	100		Diciembre 1/2015	Se espera realizar 2 talleres
Total			500,000	Preparado por: sergio Ar		Fecha: Septiembre 15/2014		
<sup>(1)</sup> Se recomienda el agrupamiento de adquisiciones de naturaleza similar tales como equipos informáticos, mobiliario, publicaciones, pasajes, etc. Si hubiesen grupos de contratos individuales similares que van a ser ejecutados en distintos períodos, éstos pueden incluirse agrupados bajo un solo rubro con una explicación en la columna de comentarios indicando el valor promedio individual y el período durante el cual serían ejecutados. Por ejemplo: En un proyecto de promoción de exportaciones que incluye viajes para participar en ferias, se pondría un ítem que diría "Pasajes aéreos Ferias", el valor total estimado en US\$ 5 mil y una explicación en la columna Comentarios: "Este es un agrupamiento de aproximadamente 4 pasajes para								
<sup>(2)</sup> <b>Bienes y Obras:</b> LP: Licitación Pública; CP: Comparación de Precios; CD: Contratación Directa.								
<sup>(2)</sup> <b>Firmas de consultoría:</b> SCC: Selección Basada en la Calificación de los Consultores; SBCC: Selección Basada en Calidad y Costo; SBMC: Selección Basada en el Menor Costo; SBPF: Selección Basada en Presupuesto Fijo. SD: Selección Directa; SBC: Selección Basada en Calidad								
<sup>(2)</sup> <b>Consultores Individuales:</b> CCIN: Selección basada en la Comparación de Calificaciones Consultor Individual ; SD: Selección Directa.								
<sup>(3)</sup> <b>Revisión ex-ante/ ex-post.</b> En general, dependiendo de la capacidad institucional y el nivel de riesgo asociados a las adquisiciones la modalidad estándar es revisión ex-post. Para procesos críticos o complejos podrá establecerse la revisión ex-ante.								
<sup>(4)</sup> <b>Revisión técnica:</b> Esta columna será utilizada por el JEP para definir aquellas adquisiciones que considere "críticas" o "complejas" que requieran la revisión ex ante de los términos de referencia, especificaciones técnicas, informes, productos, u otros.								
(5) La Selección Directa de la Universidad de los Andes se justifica por ser un contrato pequeño (igual o inferior a US\$100,000), por el reconocimiento académico que tiene la Universidad como la mejor de Colombia, y por la experiencia reconocida de varios de sus investigadores en el tema de Economía Experimental, en el cual han desarrollado numerosos trabajos en diversos campos, en especial en temas rurales. Este es un tema altamente especializado que requiere la utilización de técnicas precisas y el mal uso de las mismas puede producir resultados no confiables.								

**ENVIRONMENT, RURAL DEVELOPMENT DISASTER RISK MANAGEMENT (INE/RND)**

**INDIVIDUAL CONSULTANT**

**INDEX INSURANCE FOR ANDEAN COUNTRIES**

**TERMS OF REFERENCE**

**I. BACKGROUND**

- 1.1 Adverse selection and moral hazard has been cited as the main reasons of failure of crop insurance markets. Literature argues that the systemic risk may also be a big obstacle for crop insurance industry. As a result, insurers may not be able to provide any type of crop insurance.
- 1.2 In many developing countries, the problem is compounded by the fact that the entire insurance market may be incomplete or missing due to poor contract enforcement mechanisms and government inability to support any crop insurance programs. In addition, when they are present, informal insurance and credit markets have been characterized by high interest and premiums rates.
- 1.3 Nonmarket institutions (such as family, local, or community lending institutions) have been utilized as informal risk transfer mechanisms in rural areas of developing countries. Informal loans, diversification of income sources, and crop diversification have been mechanisms used by rural household to smooth consumption. In some cases, these systems have been better able to address the asymmetric information and transaction costs problems than formal insurance markets. However, when an extreme weather event makes farmers' losses correlated, these nonmarket institutions fail as risk management tool and as mechanism to avoid poverty traps.
- 1.4 The lack of insurance markets could be one of the causes why producers in the developing countries find themselves in a poverty trap. The extreme weather events strangle rural household economy which owns few assets. These shocks that push people below the threshold can set them onto a downward spiral into destitution, a situation that could be irreversible. Due to high risk exposure, rural household become more risk averse than otherwise. Thus, they may adopt low risk investment strategies associated with low return, which is not enough to allow rural households to escape of the poverty trap.
- 1.5 Agricultural insurance has a long history in some countries of Latin America. From the 50s until the late 80s, the programs were offered mainly by the public sector and were usually linked to loan program for small farmers. Despite the great success, most of these programs had a very poor performance, high operating costs and high losses, exacerbated by low premiums and gross mismanagement. By the late 80s most of the programs were canceled. Since the 90s governments have promoted agricultural insurance through private companies, which are usually backed by government funds. Currently 18 of the 25 countries with significant agricultural base in the region have some form of agricultural insurance program; however, premiums accounted for only 0.37% of agricultural GDP in Latin America in 2009,

compared with 6% in average Canada and USA. Latin America accounted for 4% of total agricultural insurance contracts signed worldwide in 2010, mostly concentrated in Argentina, Brazil and Mexico (85% of total), Chile, Uruguay and Paraguay (10%) and Andean (3%) countries.

- 1.6 An approach that emerged in recent years uses index insurance products as a way to alleviate the effect of natural disasters in developing countries. Different multilateral development banks have also sponsored several projects in Nicaragua, India, Ukraine, Ethiopia, Malawi, and Mongolia that attempted to facilitate risk transfer by means of index insurance. However, except for Mexico and India, demand for these weather instruments has been lower than expected. Factors like the lack of appropriate formal insurance markets, the absence of institutional framework to support trading between international and local institutions, no consensus between farmers and insurers on which weather variables affect yields, and the lack of agreement over a common pricing model are the most typical explanations for that behavior given in the literature. In this context, from a policy-maker's perspective, it is imperative to understand farmers' risk preferences in order to gain insight into the dynamics of how risk affects their demand for index insurance.

## **II. OBJECTIVE**

- 2.1 The objective of this research is to evaluate the effectiveness of index insurance product as a risk management tool for agricultural sector in the Andean Countries: Colombia, Ecuador and Peru. The research seeks: to evaluate the feasibility of index insurance products, to design these products, and to assess the potential demand for these products.

## **III. ACTIVITIES**

- 3.1 The individual consultant should be responsible for the following activities:
  - a) Data analysis.
  - b) Determine which agricultural product will be part of the study.
  - c) Assess the quantitative aspect of index insurance implementation.
  - d) Assess the qualitative aspect of index insurance implementation.
  - e) Design the index insurance scheme.
  - f) Measuring farmers' subjective perceptions of risk
  - g) Measuring farmers' risk preferences: expected utility theory and beyond
  - h) Participation in discussion seminar in Washington, DC.
  - i) Elaboration of presentation, summaries and dissemination materials, as required by IDB.

#### IV. REPORTS/OUTPUTS

- 4.1 The consultant should deliver the following:
- a) First Report: First report on data collection, research methodology, and preliminary results delivered by xxxx x, 2014 (or earlier).
  - b) Second Report: Delivered by xxxx x, 2014 (or earlier).
  - c) Final Paper: Delivery of this paper according to specific requirements outlined in the Manual of Style of the Research Network. The consultant should provide with this final version of the research paper, full access to the data used for verification and replication purposes.
- 4.2 All products, reports and documents resulting from this consultancy will be property of the IDB.
- 4.3 The dates established for product delivery can be modified prior justification and acceptance by the Bank.

#### V. SCHEDULE OF PAYMENTS

- 5.1 The payment schedule is as follows:
- a) Thirty percent (30%) at contract signing.
  - b) Twenty percent (20%) upon delivery and acceptance by IDB of the first report.
  - c) Twenty percent (20%) upon delivery and acceptance by IDB of the second report.
  - d) Thirty percent (30%) upon delivery and acceptance by IDB of the final research paper and data delivery. This final payment is also contingent on the presentation of the research paper according to specific requirements outlined in the Manual of Style of the

#### VI. SUPERVISION

- 6.1 The consultant will be under the coordination and supervision of the Project Team Leader, Mr. Sergio Ardila, ([sergioar@iadb.org](mailto:sergioar@iadb.org)) Specialist, INE/RND.

#### VII. CHARACTERISTICS OF THE CONSULTANCY

- 7.1 Type of consultancy: International Individual Consultant (PEC).
- 7.2 Contract Duration: Seven (7) months from the day the contract is signed.
- 7.3 Post of Duty: As part of his duty, the consultant must travel to Colombia, Ecuador, and Peru.

7.4 Payments: Refer to Section V of this document.

7.5 Requirement and Qualifications:

- Academic degree: PhD in Agricultural Economics and Master of Science in Economics.
- Year of related experiences: At least 8 years.
- Experience in research programs/projects in Central American and Caribbean countries
- Experience as consultant at multilateral development banks.
- Articles published in refereed journals.
- A vast research experience in: semiparametric copula-based stochastic weather generator, effectiveness of weather derivatives as a cross-hedging instrument against climate change, effects of training on competitiveness, productive efficiency in agriculture, the analysis of increasing food prices in the consumption patterns with nutritional implications, and the crop and prices responses to climate change.
- Computer skills: Matlab, ArcGis and Stata
- Languages: English and Spanish.

**ENVIRONMENT, RURAL DEVELOPMENT DISASTER RISK MANAGEMENT (INE/RND)**

**INDIVIDUAL SENIOR CONSULTANT**

**INDEX INSURANCE FOR ANDEAN COUNTRIES**

**TERMS OF REFERENCE**

**VIII. BACKGROUND**

- 1.7 Adverse selection and moral hazard has been cited as the main reasons of failure of crop insurance markets. Literature argues that the systemic risk may also be a big obstacle for crop insurance industry. As a result, insurers may not be able to provide any type of crop insurance.
- 1.8 In many developing countries, the problem is compounded by the fact that the entire insurance market may be incomplete or missing due to poor contract enforcement mechanisms and government inability to support any crop insurance programs. In addition, when they are present, informal insurance and credit markets have been characterized by high interest and premiums rates.
- 1.9 Nonmarket institutions (such as family, local, or community lending institutions) have been utilized as informal risk transfer mechanisms in rural areas of developing countries. Informal loans, diversification of income sources, and crop diversification have been mechanisms used by rural household to smooth consumption. In some cases, these systems have been better able to address the asymmetric information and transaction costs problems than formal insurance markets. However, when an extreme weather event makes farmers' losses correlated, these nonmarket institutions fail as risk management tool and as mechanism to avoid poverty traps.
- 1.10 The lack of insurance markets could be one of the causes why producers in the developing countries find themselves in a poverty trap. The extreme weather events strangle rural household economy which owns few assets. These shocks that push people below the threshold can set them onto a downward spiral into destitution, a situation that could be irreversible. Due to high risk exposure, rural household become more risk averse than otherwise. Thus, they may adopt low risk investment strategies associated with low return, which is not enough to allow rural households to escape of the poverty trap.
- 1.11 Agricultural insurance has a long history in some countries of Latin America. From the 50s until the late 80s, the programs were offered mainly by the public sector and were usually linked to loan program for small farmers. Despite the great success, most of these programs had a very poor performance, high operating costs and high losses, exacerbated by low premiums and gross mismanagement. By the late 80s most of the programs were canceled. Since the 90s governments have promoted agricultural insurance through private companies, which are usually backed by government funds. Currently 18 of the 25 countries with significant agricultural base in the region have some form of agricultural insurance program; however, premiums accounted for only 0.37% of agricultural GDP in Latin

America in 2009, compared with 6% in average Canada and USA. Latin America accounted for 4% of total agricultural insurance contracts signed worldwide in 2010, mostly concentrated in Argentina, Brazil and Mexico (85% of total), Chile, Uruguay and Paraguay (10%) and Andean (3%) countries.

- 1.12 An approach that emerged in recent years uses index insurance products as a way to alleviate the effect of natural disasters in developing countries. Different multilateral development banks have also sponsored several projects in Nicaragua, India, Ukraine, Ethiopia, Malawi, and Mongolia that attempted to facilitate risk transfer by means of index insurance. However, except for Mexico and India, demand for these weather instruments has been lower than expected. Factors like the lack of appropriate formal insurance markets, the absence of institutional framework to support trading between international and local institutions, no consensus between farmers and insurers on which weather variables affect yields, and the lack of agreement over a common pricing model are the most typical explanations for that behavior given in the literature. In this context, from a policy-maker's perspective, it is imperative to understand farmers' risk preferences in order to gain insight into the dynamics of how risk affects their demand for index insurance.

## **IX. OBJECTIVE**

- 2.2 The objective of this research is to evaluate the effectiveness of index insurance product as a risk management tool for agricultural sector in the Andean Countries: Colombia, Ecuador and Peru. The research seeks: to evaluate the feasibility of index insurance products, to design these products, and to assess the potential demand for these products.

## **X. ACTIVITIES**

- 3.1 The individual consultant should be responsible for the following activities:
  - j) Data analysis.
  - k) Determine which agricultural product will be part of the study.
  - l) Assess the quantitative aspect of index insurance implementation.
  - m) Assess the qualitative aspect of index insurance implementation.
  - n) Design the index insurance scheme.
  - o) Participation in discussion seminar in Washington, DC.
  - p) Elaboration of presentation, summaries and dissemination materials, as required by IDB.

## **XI. REPORTS/OUTPUTS**

- 11.1 The consultant should deliver the following:

- d) First Report: First report on data collection, research methodology, and preliminary results delivered by xxxx x, 2014 (or earlier).
- e) Second Report: Delivered by xxxx x, 2014 (or earlier).
- f) Final Paper: Delivery of this paper according to specific requirements outlined in the Manual of Style of the Research Network. The consultant should provide with this final version of the research paper, full access to the data used for verification and replication purposes.

11.2 All products, reports and documents resulting from this consultancy will be property of the IDB.

11.3 The dates established for product delivery can be modified prior justification and acceptance by the Bank.

## **XII. SCHEDULE OF PAYMENTS**

12.1 The payment schedule is as follows:

- e) Thirty percent (30%) at contract signing.
- f) Twenty percent (20%) upon delivery and acceptance by IDB of the first report.
- g) Twenty percent (20%) upon delivery and acceptance by IDB of the second report.
- h) Thirty percent (30%) upon delivery and acceptance by IDB of the final research paper and data delivery. This final payment is also contingent on the presentation of the research paper according to specific requirements outlined in the Manual of Style of the

## **XIII. SUPERVISION**

13.1 The consultant will be under the coordination and supervision of the Project Team Leader, Mr. Sergio Ardila, ([sergioar@iadb.org](mailto:sergioar@iadb.org)) Specialist, INE/RND.

## **XIV. CHARACTERISTICS OF THE CONSULTANCY**

- 7.6 Type of consultancy: International Individual Consultant (PEC).
- 7.7 Contract Duration: Seven (7) months from the day the contract is signed.
- 7.8 Post of Duty: As part of his duty, the consultant must travel to Colombia, Ecuador, and Peru.
- 7.9 Payments: Refer to Section V of this document.
- 7.10 Requirement and Qualifications:

- Academic degree: PhD in Agricultural, Environmental, and Development Economics and Master of Science in Economics and Computers
- Year of related experiences: At least 8 years.
- Experience in research programs/projects in Central American and Caribbean countries.
- A vast funded research experience.
- Articles published in refereed journals.
- A vast research experience in: natural disaster insurance, efficiency of weather derivatives, design of index insurance contracts, and risk-reducing effectiveness of crop insurance.
- Computer skills: Matlab and Stata

## **Ex-Ante Contractual Analysis: Weather Based Index Insurance for the Colombian Coffee Sector**

### **Terms of Reference**

#### *Background*

This consultancy has two primary objectives. The first is to provide estimates of the actuarially fair price of the two weather index insurance contracts proposed by the National Coffee Federation. The second is to estimate the level of basis risk associated with each index. The two indices are:

- Index 1: An index based on daily value of Soil Moisture.
- Index 2: An index based on daily values of Solar Radiation.

The specific definitions of the indices and contract terms (i.e., indemnity and trigger values) will be provided by the National Coffee Federation (FNC).

#### *Tasks*

- Task 1: Clean and structure the data sets from the FNC and the Colombian Institute of Hydrology, Meteorology, and Environmental Studies (IDEAM) so that they are in usable form for descriptive and statistical analysis.
- Task 2: Use the two data sets to create a time series of index values for the two forms of contracts proposed by the Coffee Federation:
  - Index 1: Soil Moisture Content;
  - Index 2: Solar Radiation.
- Task 3: Estimate the pdf's of and generate estimates of the actuarially fair price of the two indices for each weather station. The analysis should be done using both a non-parametric "burn-rate" methodology and a parametric methodology to generate estimates of the probability insurance payouts.
- Task 4: Estimate the level of basis risk associated with each of the two indices. This analysis should be based on estimation of the degree of correlation between each index and coffee yields using parametric and semi-parametric regression techniques. The data sets to be used in this analysis are the index value data sets described in Task 2 above and the semi-annual yield surveys run by the National Coffee Federation between 2000 – 2012.

*Deliverables*

- A single, cleaned data set with daily values of key weather variables from IDEAM and the FNC for all available weather stations. The data set should be delivered in STATA.
- A data set with the annual values of the two indices for all available weather stations from IDEAM and the FNC.
- A final report that:
  - Analyzes the actuarially fair price of index insurance contracts based on the two alternative indices. The analysis should evaluate the sensitivity of the price of insurance with respect to the value of the indemnity payment and the trigger level (*disparador*).
  - Describes the level of basis risk associated with the two alternative indices.
  - Makes a recommendation, based on the price and level of basis risk, regarding the appropriateness of the two alternative indices.

## **Experimental Games Implementation for Weather Based Index Insurance for the Colombian Coffee Sector**

### **Terms of Reference**

#### *Background*

In order to support the creation and expansion of index-based crop insurance markets for small-holder farmers in Colombia, the IDB is supporting a pilot index insurance program for the coffee sector. In order to optimally design the index contract and to generate valuable learning to improve future generations of the contract, the IDB is financing two key research activities associated with the pilot: experimental games with coffee farmers to explore farmers' willingness to pay for insurance and an impact evaluation of the pilot program. The primary objective of this consultancy is to implement the experimental game component. The consultant will work closely with the two PI's of the overall research program: Professor Andrés Moya (Universidad de los Andes) and Professor Stephen Boucher (UC Davis). The total sample size will be approximately 800 farmers across 40 game sessions. The sessions will be carried out in a subset of municipalities in which the pilot insurance program will be implemented.

#### *Tasks*

- Task 1: Field test the game protocol. The PI's will provide a draft of the protocol and game materials. In consultation with the PI's, the consultant will determine an appropriate subject group which may be undergraduate students in Bogotá and/or coffee farmers.
- Task 2: Modify the protocol and game material based on the results of the field tests.
- Task 3: Develop training material for the game staff (emcees and assistants).
- Task 4: Train game staff.
- Task 5: Extend invitations to and contact the sample of coffee farmers who will participate in the experimental games.
- Task 6: Implement the experimental games. The game sessions will consist of the following activities:
  - A series of unframed games to identify key individual-specific behavioral parameters including risk aversion, loss aversion, and ambiguity aversion;
  - A series of framed games designed to elicit farmers' subjective beliefs about the pdf of the proposed indices and their willingness to pay for the index insurance contracts.
  - A short exit survey collecting key socio-economic and farm variables will be administered.
  - Payment to farmers of their "show-up" fee and an additional amount based on their performance in the games.

- Task 7: Distribute premium coupons to a randomly selected sub-set of participating farmers. The PI's will provide the list of farmers who will receive the coupons. These coupons, which are part of the "Encouragement Design" for the impact evaluation, will be redeemable if the farmer decides to purchase the real insurance policy offered in the pilot program. The consultant will also be responsible for transferring the coupon value to the insurance company for those farmers who redeem their coupons.
- Task 8: Carry out data entry and cleaning of the choices made by farmers in all game activities and of the exit survey.

### *Deliverables*

- Field Test Report. This report should summarize the activities carried out in the field testing as well as the results of field testing of the game protocol. It should identify problems with the draft protocol and the actions taken to solve the problems.
- Encouragement design coupon report. This report should provide a list of the farmers who were offered coupons and the value of each coupon. The report should also identify if the farmer redeemed the coupon.
- Training manual for game staff.
- Game implementation final report. This report should include the following information:
  - Detailed description of the sample. The report should describe the sample frame and sample selection methodology. It should also provide a list of: A) Municipalities in which games will be played; B) Dates in which each game session was carried out; C) Game staff that carried out each game; D) Specific locations including names and addresses (i.e., "Agencia agraria del municipio XX en la plaza mayor del centro poblado ZZ"); E) All farmers who were invited to the game sessions; and F) All farmers who showed up and participated in game sessions.
  - A list of problems and issues that arose throughout the game sessions. This list should include both general problems with the overall methodology (for example: "Farmers did not fully understand instructions for component X of the insurance game") and problems with specific sessions or game staff (for example: "The emcee mistakenly reverses the order of the games in this session").
- Cleaned "Game" data base in STATA. This data base should contain the following information:
  - Session information: Date, time, location, identify of game staff;
  - Unique game ID code for each participant;
  - Participants' decisions in each game activity;
  - Amount of money won by each participant.
- Cleaned "Exit Survey" data base in STATA. This data base should contain all variables collected in the exit survey applied to each participating farmer at the end of the game session. It should also include the unique game ID code for each participant so that this data base can be matched with the "Game" data base.

## **Field Coordinator for Experimental Games and Impact Evaluation for Weather Based Index Insurance for the Colombian Coffee Sector**

### **Terms of Reference**

#### *Background*

In order to support the creation and expansion of index-based crop insurance markets for small-holder farmers in Colombia, the IDB is supporting a pilot index insurance program for the coffee sector. In order to optimally design the index contract and to generate valuable learning to improve future generations of the contract, the IDB is financing two key research activities associated with the pilot. The primary objective of this consultancy is to provide logistical support for the design and implementation of both activities. The consultant will work closely with the two PI's of the research program: Professor Andrés Moya (Universidad de los Andes) and Professor Stephen Boucher (UC Davis).

#### *Tasks*

- Task 1: Participate in the design of the experimental games. Specific tasks include:
  - Write the script to be used by the emcee in the game sessions;
  - Write the farmer-specific exit-survey form that will be administered to each farmer at the end of each game session.
  - Prepare the game material that will be distributed to each farmer participant.
- Task 2: Lead the field testing of the game sessions.
- Task 3: Lead the training of emcees and game assistants. This includes preparing material for training sessions and leading the training sessions.
- Task 4: Supervise the game sessions to provide quality control.
- Task 5: Participate in the research design of the impact evaluation. Specific tasks include:
  - Conduct power calculations to determine sample size and structure;
  - Participate in writing the baseline and endline survey forms;
- Task 6: Lead the field testing of the household survey forms for the impact evaluation;
- Task 7: Participate in the training sessions of the enumerators for the impact evaluation;
- Task 8: Supervise the implementation of the household surveys to provide quality control.

#### *Deliverables*

- Final versions of the following documents associated with the experimental games:
  - Emcee protocol;
  - Farmer exit survey form;

- Game materials provided to farmers.
- Final versions of the following documents associated with the impact evaluation:
  - Baseline survey;
  - Endline survey.
  - Instructions for enumerators to implement the surveys.
- Experimental Game final report. This report should document the activities carried out by the consultant in the preparation and implementation of the games. The report should also provide a descriptive analysis of:
  - The structure of the sample of participating farmers;
  - The spatial distribution of the sample;
  - The number and location of game sessions.
  - Any problems or issues that arose during the implementation of the games.
- Impact Evaluation final report. This report should document the activities carried out by the consultant in the preparation and implementation of the games. The report should also provide a descriptive analysis of:
  - The econometric identification strategy used in the research design;
  - The structure of the sample of surveyed farmers;
  - The spatial distribution of the sample;
  - Any problems or issues that arose during the implementation of the surveys.
  - Describes the level of basis risk associated with the two alternative indices.

## **Data Collection for Impact Evaluation of Weather Based Index Insurance for the Colombian Coffee Sector**

### **Terms of Reference**

#### *Background*

In order to support the creation and expansion of index-based crop insurance markets for small-holder farmers in Colombia, the IDB is supporting a pilot index insurance program for the coffee sector. In order to optimally design the index contract and to generate valuable learning to improve future generations of the contract, the IDB is financing two key research activities associated with the pilot: experimental games with coffee farmers to explore farmers' willingness to pay for insurance and an impact evaluation of the pilot program. The primary objective of this consultancy is to carry out the data collection for the impact evaluation. The consultant will work closely with the two PI's of the overall research program: Professor Andrés Moya (Universidad de los Andes) and Professor Stephen Boucher (UC Davis). The total sample size will be approximately 1000 coffee farmers spread across approximately 50 municipalities (25 treatment and 25 control) in the region in which the pilot insurance program will be implemented. This pilot region will be determined in late 2014 in consultation with the Ministry of Agriculture and Rural Development and the implementing insurance company.

Two rounds of the household survey will be implemented. The baseline survey will be implemented during the first semester (approximately March – April) of 2015. This survey will collect recall data about the second semester, 2014 coffee harvest. The follow-up survey will be implemented one year later, during first semester of 2016.

The consultant will be hired to carry out the baseline survey. Conditional on successful implementation of the baseline survey, the contract will be renewed to carry out the second round survey.

The surveys will collect information on:

- Socio-demographic variables on the farmer and the farmer's household;
- Farm and non-farm assets;
- Land-holdings and crop portfolio;
- Farm and non-farm labor market participation;
- Size and strength of informal risk sharing networks;
- Perceptions of and participation in formal financial markets, including savings, credit and insurance;
- Detailed information on coffee including:
  - History and experience in coffee production;
  - Characterization of land under coffee production (varieties, age, density, technology);
  - Cost of production;

- Yield;
- Marketing;
- Risks and shocks affecting coffee production.

### *Tasks*

- Task 1: Field test the household survey form. The PI's will provide a draft of the survey form. In consultation with the PI's, the consultant will determine an appropriate subject group for the field testing.
- Task 2: Modify the survey form based on the results of the field tests.
- Task 3: Develop training material for the field staff (enumerators and supervisors).
- Task 4: Train field staff.
- Task 5: Conduct the surveys.
- Task 6: Carry out data entry and cleaning of the surveys.

### *Deliverables*

- Field Test Report. This report should summarize the activities carried out in the field testing as well as the results of field testing of the household survey. It should identify problems with the survey draft and the actions taken to solve the problems.
- Final baseline survey form.
- Training manual for field staff.
- Baseline survey implementation final report. This report should include the following information:
  - Detailed description of the sample. The report should describe the sample frame and sample selection methodology, including replacement strategy for households who cannot be found or refuse to be interviewed. It should also summarize the distribution of the sample by municipality and treatment versus control groups.
  - A list of problems and issues that arose throughout the implementation of the baseline survey. This list should include both general problems with the overall survey methodology (for example: "Farmers did not fully understand question #4 of Section 3") and problems with specific sessions or game staff (for example: "Enumerator José was found to be fabricating data and was replaced").
- Cleaned household data bases in STATA. The number and structure of the data bases should be determined in consultation with the PI's. Double-entry of data should be used to minimize data entry errors. All variables should have clear variable names and value labels. The naming conventions should be determined in consultation with the PI's.

- Data Dictionary. This dictionary should provide variable names and value labels for all variables in the household data set. It should also include the following information for each variable: mean, min, max, and the number of valid and missing observations.

## **Research Design and Implementation: Experimental Games and Impact Evaluation of Weather Based Index Insurance for the Colombian Coffee Sector (Co-PI)**

### **Terms of Reference**

#### *Background*

In order to support the creation and expansion of index-based crop insurance markets for small-holder farmers in Colombia, the IDB is supporting a pilot index insurance program for the coffee sector. In order to optimally design the index contract and to generate valuable learning to improve future generations of the contract, the IDB is financing two key research activities associated with the pilot: experimental games with coffee farmers to explore farmers' willingness to pay for insurance and an impact evaluation of the pilot program. The primary objective of this consultancy is to design the two research components, supervise the data collection and carry out the analysis based on the data that is collected. Separate consultants will be hired to carry out the field work and basic data analysis associated with this project. The consultant hired here will coordinate and supervise these additional consultants which include: A) Consultant to carry out ex-ante analysis of the actuarial fair premia and basis risk associated with the proposed index contracts; B) A field coordinator for the experimental games and the impact evaluation surveys; C) Consultant to implement the experimental games; D) Consultant to implement the household data collection for the impact evaluation.

The consultant will also work closely with the Ministry of Agriculture and Rural Development, the National Coffee Federation and the insurance company that will offer the contract.

The Experimental games will be carried out prior to the pilot offering and impact evaluation surveys. The expectation is that the games will take place between December, 2014 and February, 2015. Two rounds of the household survey should be implemented. The baseline survey will be implemented during the first semester (approximately March – April) of 2015. This survey will collect recall data about the second semester, 2014 coffee harvest. The follow-up survey will be implemented one year later, during first semester of 2016.

#### *Tasks*

- Task 1: Design the methodology for the experimental games. Key questions that should be answered include:
  - What is the degree of risk aversion, loss aversion, and ambiguity aversion among Colombian coffee farmers?

- How variable are the subjective beliefs of the pdf of coffee yields and the specific indices that will be used in the index contracts?
- What is the distribution and determinants of coffee farmers' willingness to pay for the proposed index insurance contracts?
- Task 2: Supervise the consultant/firm hired to implement the experimental games.
- Task 3: Design the methodology for the impact evaluation of the index insurance contract offered in the pilot program. The methodology includes:
  - A clearly defined identification strategy that permits estimation of the causal impact of the insurance on key outcome variables including: A) Yields; B) Investment and key production practices; and C) Credit market participation. Additional outcome variables may be identified.
  - An appropriate sampling strategy;
  - An appropriate data collection strategy including the farmer/household survey.
- Task 4: Supervise the consultant/firm hired to implement the impact evaluation surveys.
- Task 5: Generate and present results of both components (Experimental Games and Impact Evaluation) to relevant audiences (IDB, Ministry of Agriculture and Rural Development, National Coffee Federation).

### *Deliverables*

The consultant will deliver the following reports to the IDB. Each of these reports will be co-authored with CO-PI Boucher.

- Research Design Report: Experimental Games. This report should describe methodology to be used in the experimental games component, including the specific research questions to be answered, the structure of the game sessions, the structure of the sample, and the econometric equations to be estimated.
- Research Design Report: Impact Evaluation. This report should describe the methodology to be used in the impact evaluation component, including the specific impact evaluation hypotheses to be answered, the identification strategy to be used, the structure of the sample and the econometric equations to be estimated.
- Final Report: Experimental Games. This report should provide a detailed description of the methodology used in the experimental games component, a description of the farmers who participated and the key findings from the experimental games component.
- Baseline Report: Impact Evaluation. This report will provide a detailed description of the sample selection strategy. It will also provide a detailed description of the sample of farmers participating in the impact evaluation survey, including take-up rates of the insurance contract. This report should also include an analysis of the validity of the randomization, including balance tests of the treatment versus control farmers and the predictive power of the coupons used in the encouragement design.

- Endline Report: Impact Evaluation. This report will summarize the implementation of the second round survey and will include a discussion of sample attrition and other issues faced in the follow-up survey.
- Final Report: Impact Evaluation. This report will present the analysis and key findings of the impact evaluation. The report should include recommendations on whether the insurance program should be scaled up and, if so, what improvements should be made in the contract design.

## **Research Design and Implementation: Experimental Games and Impact Evaluation of Weather Based Index Insurance for the Colombian Coffee Sector (Co-PI-Senior)**

### **Terms of Reference**

#### *Background*

In order to support the creation and expansion of index-based crop insurance markets for small-holder farmers in Colombia, the IDB is supporting a pilot index insurance program for the coffee sector. In order to optimally design the index contract and to generate valuable learning to improve future generations of the contract, the IDB is financing two key research activities associated with the pilot: experimental games with coffee farmers to explore farmers' willingness to pay for insurance and an impact evaluation of the pilot program. The primary objective of this consultancy is to design the two research components, supervise the data collection and carry out the analysis based on the data that is collected. Separate consultants will be hired to carry out the field work and basic data analysis associated with this project. The consultant hired here will coordinate and supervise these additional consultants which include: A) Consultant to carry out ex-ante analysis of the actuarial fair premia and basis risk associated with the proposed index contracts; B) A field coordinator for the experimental games and the impact evaluation surveys; C) Consultant to implement the experimental games; D) Consultant to implement the household data collection for the impact evaluation.

The consultant will also work closely with the Ministry of Agriculture and Rural Development, the National Coffee Federation and the insurance company that will offer the contract.

The Experimental games will be carried out prior to the pilot offering and impact evaluation surveys. The expectation is that the games will take place between December, 2014 and February, 2015. Two rounds of the household survey should be implemented. The baseline survey will be implemented during the first semester (approximately March – April) of 2015. This survey will collect recall data about the second semester, 2014 coffee harvest. The follow-up survey will be implemented one year later, during first semester of 2016.

#### *Tasks*

- Task 1: Supervise the consultant hired to conduct the ex-ante contract analysis. Provide guidance on the statistical and econometric methodologies to be used in this analysis.
- Task 2: Design the methodology for the experimental games. Key questions that should be answered include:

- What is the degree of risk aversion, loss aversion, and ambiguity aversion among Colombian coffee farmers?
- How variable are the subjective beliefs of the pdf of coffee yields and the specific indices that will be used in the index contracts?
- What is the distribution and determinants of coffee farmers' willingness to pay for the proposed index insurance contracts?
- Task 3: Design the methodology for the impact evaluation of the index insurance contract offered in the pilot program. The methodology includes:
  - A clearly defined identification strategy that permits estimation of the causal impact of the insurance on key outcome variables including: A) Yields; B) Investment and key production practices; and C) Credit market participation. Additional outcome variables may be identified.
  - An appropriate sampling strategy;
  - An appropriate data collection strategy including the farmer/household survey.
- Task 4: Generate and present results of both components (Experimental Games and Impact Evaluation) to relevant audiences (IDB, Ministry of Agriculture and Rural Development, National Coffee Federation).

### *Deliverables*

The consultant will deliver the following reports to the IDB. Each of these reports will be co-authored with CO-PI Moya.

- Research Design Report: Experimental Games. This report should describe methodology to be used in the experimental games component, including the specific research questions to be answered, the structure of the game sessions, the structure of the sample, and the econometric equations to be estimated.
- Research Design Report: Impact Evaluation. This report should describe the methodology to be used in the impact evaluation component, including the specific impact evaluation hypotheses to be answered, the identification strategy to be used, the structure of the sample and the econometric equations to be estimated.
- Final Report: Experimental Games. This report should provide a detailed description of the methodology used in the experimental games component, a description of the farmers who participated and the key findings from the experimental games component.
- Baseline Report: Impact Evaluation. This report will provide a detailed description of the sample selection strategy. It will also provide a detailed description of the sample of farmers participating in the impact evaluation survey, including take-up rates of the insurance contract. This report should also include an analysis of the validity of the randomization, including balance tests of the treatment versus control farmers and the predictive power of the coupons used in the encouragement design.

- Endline Report: Impact Evaluation. This report will summarize the implementation of the second round survey and will include a discussion of sample attrition and other issues faced in the follow-up survey.
- Final Report: Impact Evaluation. This report will present the analysis and key findings of the impact evaluation. The report should include recommendations on whether the insurance program should be scaled up and, if so, what improvements should be made in the contract design.