Lao People's Democratic Republic
Rice Policy Study

2012

IRRI
INTERNATIONAL RICE RESEARCH INSTITUTE

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Paavo Eliste
Senior Economist, World Bank

Nuno Santos
Investment Centre Division, FAO

working under the overall guidance of:

Dr Phouang Parisak Pravongviengkham
Vice-Minister of MAF, Lao PDR

IRRI
International Rice Research Institute

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ABBREVIATIONS AND ACRONYMS

ACIAR	Australian Centre for International Agricultural Research
ADS	Agricultural Development Strategy
AIP	Agricultural Investment Plan
AMP	Agricultural Master Plan
APB	Agricultural Promotion Bank
AQUASTAT	FAO Information System on Water and Agriculture
ASEAN	Association of Southeast Asian Nations
BAAC	Bank for Agriculture and Agricultural Cooperatives (Thailand)
BS	breeder seed
CFSVA	Comprehensive Food Security and Vulnerability Analysis (WFP)
CPI	Consumer Price Index
DAFEO	District Agriculture and Forestry Extension Office
DICO	District Department of Industry and Commerce
DoA	Department of Agriculture
DoI	Department of Irrigation
DTD	Domestic Trade Department
EDL	Electricité du Laos
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Agricultural Statistics
FSEW	farming system extension worker
GDP	Gross Domestic Product
IFC	International Finance Corp.
IRRI	International Rice Research Institute
LEAP	Lao Extension for Agriculture Project
LECS	Lao PDR Expenditure and Consumption Survey
LUFSIP	Lao Uplands Food Security Improvement Project
MAF	Ministry of Agriculture and Forestry
MPS	market price support
NAFES	National Agricultural and Forestry Extension Service

NAFReC	Northern Agriculture and Forestry Research Centre
NAFRI	National Agriculture and Forestry Research Institute
NBB	Nayobi Bank
NNP	National Nutrition Policy
NNS	National Nutrition Strategy
NPAC	National Plan of Action
NRR	Nominal Protection Rate
NSC	National Statistics Centre
NSEDP	National Socio-Economic Development Plan
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares
PAFEC	Provincial Agricultural and Forestry Extension Centre
PAFO	Provincial Agriculture and Forestry Office
PICO	Provincial Department of Industry and Commerce
PIP	Public Investment Programme
PSE	producer support estimate
RPIP	Rice Productivity Improvement Project
SMC	seed multiplication centre
SMS	subject matter specialist
SNV	Netherlands Development Organisation
UNISDR	United Nations International Strategy for Disaster Reduction
VES	village extension system
VEW	village extension worker
WB	The World Bank
WFP	World Food Programme
WUA	water user association
WUG	water user group

ບົດສະຫຼຸບຫຍໍ້

ປະຫວັດຄວາມເປັນມາ.

ຜົນຂອງການສຶກສານີ້ໄດ້ຢັ້ງຢືນວ່າການປ່ຽນທາງດ້ານໂຄງສ້າງຂອງຂະແໜງການເຂົ້າໄດ້ເລີ່ມສືບ ມາແລ້ວ. ຖ້າເບິ່ງໃນທາງກວ້າງການປ່ຽນແປງຂອງຂະແໜງການແມ່ນເກີດຂຶ້ນຈາກຫຼາຍປັດໃຈ ເຊິ່ງມີຫຼາຍ ບັນຫາທີ່ພົວພັນກັນເຊິ່ງບໍ່ຕິດພັນກັບນະໂຍບາຍເຂົ້າຂອງຂະແໜງການໂດຍກົງຂອງລັດຖະບານລວມມີ: (I) ການເພີ່ມຂຶ້ນຢ່າງຕໍ່ເນື່ອງ ຂອງລວມຍອດຜະລິດຕະພັນພາຍໃນແມ່ນ ເກີດມາຈາກການ ສົ່ງອອກ ແຮ່ທາດ ແລະ ພະລັງງານໄຟຟ້ານ້ຳຕົກ (II) ການຈ້າງງານໃນຂະແໜງທີ່ບໍ່ແມ່ນການຄ້າ, ບໍ່ແມ່ນຂະແໜງ ກະສິກຳ ແລະ ໃນປະເທດໃກ້ຄຽງ ໄດ້ມີການຕິດພັນກັບການເພີ່ມລາຍຮັບ. (III) ການຂາດ ແຄນແຮງງານ ໃນຂະແໜງ ກະສິກຳເພີ່ມຂຶ້ນ ແລະ ອາຍຸຂອງຊາວກະສິກອນກໍເຖົ້າແກ່ລົງເລື້ອຍໆ (IV) ການຂະຫຍາຍຕົວຂອງຕົວເມືອງ ແລະ ຕິດພັນກັບການປ່ຽນແປງວິທີການບໍລິໂພກ ແລະ (V) ການດົ້ງຕົວຂອງ ອັດຕະການບໍລິໂພກ ເຂົ້າໃນລະດັບຊາດອັນມີຕົ້ນມາຈາກການຫຼຸດຂອງອັດຕາເພີ່ມ ຂອງພົນລະເມືອງ ແລະ ຫັນໄປບໍລິໂພກອາຫານ ຫຼາຍຊະນິດທີ່ບໍ່ແມ່ນເຂົ້າ ແລະ ມີການໄລຍິສຸງ (ພະລັງງານ). ນອກນັ້ນການເກີດຂຶ້ນຂອງ ພາກສ່ວນເອກະຊົນ ໃໝ່ທີ່ຜະລິດພືດເພື່ອສົ່ງອອກ (ເຊັ່ນ: ການເຜ, ຢາງພາລາ, ກວ້ຍ, ສາລີ ແລະ ມັນຕົ້ນ) ໄດ້ກະຕຸ້ນໃຫ້ຊາວນາ ຫັນປ່ຽນໄປປູກພືດຊະນິດອື່ນ (ເຖິງຢ່າງນ້ອຍກໍຫຼຸດເນື້ອທີ່ປູກເຂົ້າ ແລະ ຜະລິດເຂົ້າພໍແຕ່ກຸ້ມກິນພາຍໃນ ຄອບຄົວ ເທົ່ານັ້ນ)

ໃນສະພາບປັດຈຸບັນນະໂຍບາຍຂອງລັດຖະບານກ່ຽວກັບການແຍກຂະແໜງການຜະລິດເຂົ້າອອກເປັນ ການຜະລິດໃນທົ່ງນາ ແລະ ຫຼັງເກັບກ່ຽວ ຊຶ່ງຄຸ້ມຄອງໂດຍ ຂະແໜງການ ຫຼື ກະຊວງຕ່າງກັນ (ຊຶ່ງຄ້າຍຄືວ່າ ມີການຂັດກັນທາງດ້ານເປົ້າໝາຍ) ແລະ ຈະບໍ່ມີປະສິດທິຜົນ. ການເພີ່ມຂຶ້ນຂອງຈຳນວນ ຊາວນາ ທີ່ຜະລິດສິນຄ້າອີງຕາມຂໍ້ມູນການສຳຫຼວດກະສິກຳປີ 2010 ສະແດງໃຫ້ເຫັນວ່າການລົງທຶນເພື່ອເພີ່ມ ຜົນຜະລິດຕ້ອງໄດ້ມີການຄຸ້ມຄອງລະຫວ່າງມາດຕະການຕ່າງໆ ເພື່ອຄວາມຍືນຍົງຂອງສະພາບແວດລ້ອມດ້ານ ການຄ້າ ແລະ ຜົນສະທ້ອນຕໍ່ນະໂຍບາຍການຄ້າ.

ວຽກງານ ນະໂຍບາຍ

ໄດ້ມີເອກະສານອ້າງອີງທີ່ສຳຄັນ 3 ສະບັບ ທີ່ຊ່ວຍວາງຂອບຍຸດທະສາດຂອງຂະແໜງການເຂົ້າ. (I) ບົດລາຍງານການເມືອງ ຂອງກອງປະຊຸມຄັ້ງທີ 8 ຂອງ ສູ ກາງພັກຕໍ່ກອງປະຊຸມໃຫຍ່ຄັ້ງທີ 9 ປີ ຂອງພັກ ປີ 2011. (II) ແຜນພັດທະນາເສດຖະກິດ-ສັງຄົມ ຄັ້ງທີ 7 (2011-2015) ແລະ (III) ຍຸດທະສາດພັດທະນາກະສິກຳ 2011-2020. ຊຶ່ງຕິດພັນກັບແຜນແມ່ບົດກະສິກຳ, ທີ່ສະໜອງທິດທາງ ໃນການຈັດຕັ້ງປະຕິບັດແຜນແມ່ນບົດກະສິກຳ. ແຜນແມ່ບົດກະສິກຳໄດ້ສະເໜີກອບວຽກ, ສຳລັບກາ ປະຕິບັດຍຸດທະສາດກະສິກຳແລະວິທີທາງອອກເພື່ອໃຫ້ອົງກອນຕ່າງໆໄດ້ເຂົ້າໃຈແຈ້ງໃນການ ລົງມືຈັດຕັ້ງປະຕິບັດໃນລະດັບຊາດ ແຂວງ ແລະ ເມືອງເພື່ອບັນລຸຜົນສຳເລັດເປົ້າໝາຍປີ 2015 ຂອງຍຸດທະສາດການພັດທະນາກະສິກຳ. ແຜນການລົງທຶນກະສິກຳທີ່ກ່ຽວຂ້ອງໄດ້ສະໜອງ ມາດຕະການຂອບເຂດວຽກ ແລະ ກອບການລົງທຶນ ທີ່ຕິດພັນກັບແຜນແມ່ບົດ. ດັ່ງນັ້ນ, ແຜນການລົງທຶນ ຂອງຂະແໜງການກະສິກຳແມ່ນພາທະນະຕົ້ນຕໍ ເພື່ອເປັນບ່ອນອີງໃນການປຶກສາຫາລືກ່ຽວກັບການລົງທຶນ ໃນແຜນແມ່ບົດຂອງລັດຖະບານ ສປປ ລາວ ກ່ອນອື່ນໝົດກໍ່ແມ່ນ ກັບຄູ່ຮ່ວມພັດທະນາ.

ບົດລາຍງານການເມືອງໄດ້ຮັບຮູ້ຄວາມສຳຄັນຂອງຂະແໜງການກະສິກຳ ແລະປ່າໄມ້ຊຶ່ງເປັນຂະແໜງຕົ້ນຕໍຂອງໂຄງປະກອບເສດຖະກິດແຫ່ງຊາດ ແລະຮຽກຮ້ອງໃຫ້ມີການປ່ຽນແປງຂັ້ນພື້ນຖານໃນອຸດສະຫະກຳເຂົ້າ ຂອງສປປລາວໃຫ້ຫັນເປັນຫັນສະໄໝໃນຂະແໜງການຍົກລະດັບການຜະລິດເປັນສິນຄ້າ, ແຜນພັດທະນາເສດ ຖະກິດສັງຄົມແຫ່ງຊາດ ແນໃສ່ເຮັດສຳເລັດການເພີ່ມຂຶ້ນຢ່າງຍືນຍົງຂອງເສດຖະກິດ ແລະ ຫຼຸດຜ່ອນຄວາມທຸກ ຍາກ. ຍຸດທະສາດການພັດທະນາກະສິກຳຊຶ່ງມີເປົ້າໝາຍເບື້ອງຕົ້ນໃນປີ2015ເພື່ອບັນລຸໄດ້ການຄ້ຳປະກັນສະ ບຽງອາຫານ ກ້າວໄປເຖິງ ບັນລຸໄດ້ຄວາມຕ້ອງການດ້ານໂພສະບາການ (ການລິ ຫຼື ພະລັງງານ) ໂດຍສະເພາະໃນເຂດຫ່າງໄກ ຊອກຫຼີກ ທີ່ຂາດແຄນ ເຂົ້າກິນ.

ເພື່ອບັນລຸເປົ້າໝາຍເຫຼົ່ານີ້ບໍ່ມີພຽງແຕ່ນະໂຍບາຍກ່ຽວກັບເຂົ້າ ແຕ່ອັນດຽວ ແຕ່ມີຫຼາຍໆນະໂຍບາຍທີ່ນຳ ໃຊ້ເຄື່ອງມືທີ່ແຕກຕ່າງກັນ. ສິ່ງເຫຼົ່ານີ້ຊີ້ໃຫ້ເຫັນເຖິງຄວາມສັບສົນຂອງຂະແໜງການເຂົ້າ. ໝວດນະໂຍບາຍທີ່ ບໍ່ຈຳເປັນໃຊ້ເງິນປະມານແມ່ນພົວພັນກັບຂະແໜງການການຄ້າລວມທັງນະໂຍບາຍຫ້າມສົ່ງອອກ, ນະໂຍບາຍ ພາສີ ເພາະຂະແໜງການກະສິກຳ ບໍ່ພົວພັນກັບພາສີໂດຍກົງສັກເທົ່າໃດ ຂະແໜງການເສດຖະກິດອື່ນໆ. ບັນດາ ນະໂຍບາຍທີ່ຕ້ອງການເງິນປະມານເຂົ້າຊ່ວຍ ຊາວກະສິກອນ (ແນວພັນ, ໄຟຟ້າ, ສິນເຊື່ອ, ການ ສະ ້ ບສະ ຸ ດ້ າ ສົ່ງເສີມ).ບັນດານະໂຍບາຍຊ່ວຍຊາວກະສິກອນເພື່ອເຮັດການຜະລິດກະສິກຳແບບ ລວມໝູ່ໄດ້ແກ່ການຄົ້ນຄວ້າ ແນວພັນເຂົ້າ ແລະການ ຄຸ້ມຄອງດ້ າ ທາດຢ ຳລຸງ ໃ ເຂົ້າ.

ການດຳເນີນງານຂອງຂະແໜງການເຂົ້າ

ສືບຕໍ່ການຂະຫຍາຍເນື້ອທີ່ການ ຜະລິດເຂົ້າ. ເຊິ່ງເຮັດໃຫ້ການ ຜະລິດເຂົ້າ ໃ ຊ ມປີ1990 ເຫຼືອກິນ ແລະ ເພີ່ມຂຶ້ນ,ການໃຊ້ແນວພັນເຂົ້າປັບປຸງແມ່ນບັດໃຈໜຶ່ງດຽວທີ່ມີຄວາມສຳຄັນຢ່າງຍິ່ງໃນການບັນລຸການເພີ່ມຜົນ ຜະລິດ. ການເພີ່ມຜົນຜະລິດ ເຂົ້າເຮັດໃຫ້ ສປປ ລາວ ບັນລຸໄດ້ຜົນຜະລິດເຂົ້າພຽງພໍກັບຄວາມຕ້ອງການ ໃນລະດັບຊາດ, ສ່ວນໃນລະດັບ ທ້ອງຖິ່ນ: ຂົນແຂວງຍັງບໍ່ທັນມີເຂົ້າກິນພຽງພໍໃນລະດັບແຕກຕ່າງກັນ ໂດຍສະເພາະຢູ່ໃນບັນດາແຂວງພາກເໜືອ.

ເຖິງວ່າຜົນຜະລິດໄດ້ບັນລຸເປົ້າໝາຍກ່ຕາມ, ແຕ່ກ່ຍັງມີຫຼາຍຂໍ້ຈຳກັດທີ່ສືບຕໍ່ເຊັ່ນ: ກາ ບໍລິກາ

ສົ່ງເສີມຍັງບໍ່ເຂັ້ມແຂງແລະມີຄວາມຫຍຸ້ງຍາກໃນການເຂົ້າເຖິງສິນເຊື່ອ, ພ້ອມດຽວກັນນັ້ນ ມີຂໍ້ຫຍຸ້ງຍາກ ໃນທາງປະຕິບັດ ທີ່ກະທົບໃສ່ຜົນຜະລິດ ຫຼັງຈາກເກັບກ່ຽວ ໂດຍສະເພາະ ຄຸນນະພາບເຂົ້າ, ສາງ ເກັບມ້ຽນ, ໂຄງລ້າງ ແລະ ຄວາມອາດສາມາດໃນການດຳເນີນງານຂອງໂຮງສີເຂົ້າ. ການສີເຂົ້າ ສ່ວນໃຫຍ່ແມ່ນສີຢູ່ຕາມໂຮງສີນ້ອຍ
ໃນໝູ່ບ້ານເຊິ່ງຍັງຂາດເຂີນວັດຖຸອຸປະກອນຫຼາຍຢ່າງເຮັດໃຫ້ອັດຕາເຂົ້າທີ່ອອກມາມີເປີເຊັນຕ່ຳ. ໃນລະດັບ ນະໂຍບາຍ ຍັງມີຫຼາຍບັນຫາທີ່ຍັງບໍ່ທັນສອດຄ່ອງ ກັບຄວາມ ເປັນຈິງໂດຍສະເພາະນະໂຍບາຍການຄ້າ ຊາຍແດນ ເຮັດໃຫ້ຈຳກັດການຂະຫຍາຍຕົວຂອງຂະແໜງການເຂົ້າ.

ຄືນຈາກການສຶກສາວິໃຈກັບຄອບຄົວຕົວແບບສະແດງໃຫ້ເຫັນວ່າຜົ ໄດ້ຮັບຂອງຄອບຄົວຊາວນາ ຍັງຕ ຳ ເຮັດໃຫ້ບໍ່ສາມາດມີລາຍຮັບພຽງພໍ(ຫຼືຄ່າແຮງງານຕ ຳ) ເຊິ່ງເປັນຄືນສະທ້ອນທາງລົບ ໃຫ້ແກ່ ການຕອບສະໜອງແຜນການລົງທຶນຂອງລັດເຂົ້າໃນຂະແໜງ ການຜະລິດເຂົ້າ ແລະ ເປົ້າໝາຍນະໂຍບາຍ ຂອງລັດຖະບາ . ຂໍ້ມູນການສຳຫຼວດສະຖິຕິກະສິກຳປີ 2010 -2011 ສະແດງໃຫ້ເຫັນອັດຕາການສ່ວນຄອບຄົວ ທີ່ປູກເຂົ້າລົດລົງຈາກ 77% ໃນປີ 1998/99 ຍັງພຽງ 71% ໃນປີ 2010/2011 ເຊິ່ງການຜະລິດເຂົ້າ ໄດ້ເພີ່ມຂຶ້ນໃນເຂດທີ່ມີເງື່ອນໄຂ ທຳມະຊາດ ອຳນວຍຄວາມສະດວກໄດ້ດີກວ່າເຊັ່ນ: ຢູ່ເຂດທົ່ງພຽງພາກໃຕ້.

ການວິໄຈລະອຽດໄດ້ເຮັດໃນພາກການຜະລິດເຂົ້າ,ການບໍລິໂພກເຂົ້າ ແລະການດຸນດຸ່ງການສົ່ງອອກ
ເຂົ້າທີ່ເຫຼືອກິນລະຫວ່າງປີ 2012-2020.

ເຫັ ໄດ້ຈາກຫລາຍປັດໃຈລວມທັງການຄາດຄະເນການຂະຫຍາຍເນື້ອທີ່ປູກເຂົ້າ ແລະການເພີ່ມຂຶ້ນຂອງຜົນຜະ
ລິດເຂົ້າ,ຜົນເສຍຫາຍທີ່ເກີດຂຶ້ນຈາກຜູ້ງການເກັບກ່ຽວ,ອັດຕາການສີເຂົ້າການເພີ່ມຂຶ້ນຂອງການຜຍິດເຂົ້າທີ່ບ
ແມ່ນສະບຽງ ແລະການປ່ຽນແປງຂອງຜົນລະເມືອງ(ອັດຕາການເພີ່ມຂຶ້ນຂອງຜົນລະເມືອງ ແລະການຂະຫຍາຍ
ຕົວເມືອງ, ອັດຕາການບໍລິໂພກ ເຂົ້າຕໍ່ຫົວຄົນ).

ຜົນຂອງການວິໄຈສະແດງໃຫ້ເຫັນວ່າ ສປປ ລາວ ສືບຕໍ່ຜະລິດເຂົ້າເຫຼືອກິນ ໃນລະດັບຊາດທີ່ໝັ້ນຄົງ
ແມ່ນແຕ່ຢູ່ໃນສົມມຸດຖານດັ້ງເດີມກ່ຽວກັບ ສະພາບເພີ່ມຂຶ້ນຂອງຜົນລະເມືອງ ແລະ ຜົນຜະລິດ/ຜະລິດຕະພາບ.
ຂໍ້ມູນດັ່ງກ່າວສະແດງໃຫ້ເຫັນວ່າສປປລາວຈະສືບຕໍ່ສົ່ງອອກເຂົ້າທີ່ເຫຼືອກິນໃນອັດຕາທີ່ໝັ້ນຄົງເຖິງແມ່ນວ່າການ
ຂະຫຍາຍຕົວຂອງການຜະລິດເຂົ້າມີການປ່ຽນແປງເລັກນ້ອຍ ແລະອັດຕາການເພີ່ມຂຶ້ນຂອງຜົນລະເມືອງຍັງສູ
ເກົ່າ. ຮອດປີ2015, ການສົ່ງອອກເຂົ້າທີ່ເຫລືອກິນຄາດວ່າຈະໄດ້ 0,45-0,5
ລ້ານໂຕນ(ຈາກການສົ່ງອອກໃນປັດຈຸບັນ 0,3 ລ້ານໂຕນ).

ສິ່ງທ້າທາຍໃນການຜະລິດເຂົ້າ.

ຂະແໜງການຜະລິດເຂົ້າຂອງລາວໄດ້ເຄື່ອນຈາກການຂາດແຄນເຂົ້າ ມາເຖິງ ກຸ້ມກິນ ແລະ ໄດ້ຜ່ານ
ຂະບວນການປ່ຽນແປງຢ່າງເລິກເຊິ່ງໃນລະດັບການບໍລິໂພກ ແລະ ການຜະລິດ, ນະໂຍບາຍໃນ ປັດຈຸບັນ
ອາດຈະບໍ່ແທດເໝາະອີກຕໍ່ໄປແລ້ວເພື່ອໃຫ້ບັນລຸໄດ້ເປົ້າໝາຍຫຼັກຂອງລັດຖະບານດ້ານການ ຄ້ຳປະກັນສະບຽງ
ອາຫານ ແລະ ການຂະຫຍາຍຕົວທາງເສດຖະກິດ. ພ້ອມນີ້ກໍໄດ້ເຫັນຊ່ອງທາງ ຫຼາຍຢ່າງ ໃນການປັບປຸງ
ນະໂຍບາຍປັດຈຸບັນໂດຍການປະສານງານ ຕົວຈິງໃຫ້ຫຼາຍຂຶ້ນກ່ຽວກັບ ນະໂຍບາຍການສົ່ງເສີມການຜະລິດເຂົ້າ
ແລະປະກອບທຶນຮອນໃຫ້ມີປະສິດທິຜົນໃຫ້ແກ່ຊາວນາ.ສປປລາວໄດ້ມາເຖິງຈຸດທີ່ການຄ້ຳປະກັນສະບຽງອາຫາ
ນ(ລວມທັງໂພສະນາການ)ບໍ່ແມ່ນພາລະບົດບາດໜຶ່ງດຽວຂອງການຜະລິດເຂົ້າເຫຼືອກິນ,ໃນເມື່ອປະເທດຊາດ
ຫາກຜ່ານພົ້ນຈາກ ຂາດເຂົ້າກິນ ມາເຖິງເຂົ້າເຫຼືອກິນ ແລະ ການບໍລິໂພກເຂົ້າກໍໄດ້ເພີ່ມຂຶ້ນ ເຊິ່ງເປັນແຫ່ງ
ພະລັງງານຫຼັກໃນຄະນະດຽວກັນນັ້ນການຂາດເຂີນທາງດ້ານໂພສະນາການໄດ້ປ່ຽນແປງຈາກເຂົ້າຫັນໄປຫາສະ
ບຽງອາຫານອື່ນໆ.ການຄ້ຳປະກັນສະບຽງອາຫານໂດຍອີງໃສ່ເຂົ້າເປັນຫຼັກແມ່ນເປັນບັນຫາຂອງບາງທ້ອງຖິ່ນ
ເທົ່ານັ້ນ.ການຄ້ຳປະກັນສະບຽງອາຫານໃນທາງກ້ວາງເລັ່ງໃສ ບັນຫາ ຂາດແຄນໂພສະນາການ ຫຼາຍກວ່າການ
ຂາດເຂົ້າກິນ.ທັດສະນະປັດຈຸບັນໃນການນຳໃຊ້ນະໂຍບາຍທີ່ເປ ເຄື່ອງມືອັນດຽວ (ນະໂຍບາຍການຄ້າທີ່ສຳຄັນຄື
ອັກສາລາຄາເຂົ້າພາຍໃນໃຫ້ຢູ່ໃນລະດັບຕ່ຳ)ເພື່ອແກ້ໄຂຄວາມທ້າທາຍຂອງການຄ້ຳປະກັນສະບຽງອາຫານອາດ
ຈະບໍ່ເໝາະສົມໃນສະພາບກາ ມີເຂົ້າເຫລືອກິ ເພີ່ມຂຶ້ນ.

ການຄ້ຳປະກັນສະບຽງອາຫານທີ່ຈັດດ້ວຍການເຂົ້າເຖິງເຂົ້າກິນອາດຈະບໍ່ແມ່ນ ບັນຫາຫຼັກ ຂອງ
ປະເທດອີກແລ້ວ ແຕ່ແມ່ນບັນຫາຂອງທ້ອງຖິ່ນທີ່ຢູ່ໃນເຂດພູດອຍ, ນອກຈາກນີ້ໃນເວລາ ທີ່ ສປປລ
ຫາກມີໄພທຳມະຊາດທີ່ຮ້າຍແຮງ, ການວິໄຈດັ່ງກ່າວໄດ້ສະແດງໃຫ້ເຫັນວ່າຂະຫຍາຍການຜະລິດເຂົ້າ ແລະ
ສະພາບທ້ອງຖິ່ນທີ່ມີອາກາດກະທົບຮ້າຍແຮງຈະແມ່ນແຫ້ງແລ້ງ ຫຼື ນ້ຳຖ້ວມ ສປປ ລາວ ກໍສາມາດຜະລິດ
ເຂົ້າກິນພຽງພໍສຳລັບຄວາມຕ້ອງການພາຍໃນປະເທດ ແລະ ສາມາດຜະລິດເຫຼືອກິນ ເພື່ອສົ່ງອອກໄດ້. ຈຸດລວມໃນການສະໜັບສະໜູນແຜນການຄ້ຳປະກັນດ້ານສະບຽງອາຫານ ທີ່ພົວພັນ ກັບການຜະລິດເຂົ້າ
ຕ້ອງເລັ່ງໃສ່ບາງເປົ້າໝາຍກຸ່ມຄົນ ແລະ ທ້ອງຖິ່ນສະເພາະເທົ່ານັ້ນ. ພ້ອມດຽວກັນ ນັ້ນກໍ່ລວມລວມເອົາ
ຄວາມຕ້ອງການຂອງທ້ອງຖິ່ນ ເພື່ອສ້າງເປັນເຄືອຄ່າຍເຕືອນໄພ ແລະ ອົງປະກອບເພື່ອ ກຽມພ້ອມໃນການຕ້ານ
ໄພທຳມະຊາດ.

ການປັບປຸງດ້ານໂພສະນາການແມ່ນມີການພົວພັນ ຢ່າງສະໜິດແໜ້ນ ກັບນະໂຍບາຍ ຍີກລະດັບ
ລາຍຮັບຂອງຄອບຄົວ, ການສຶກສາ ແລະ ຄວາມເອົາໃຈໃສ່ນຳໃຊ້ສະບຽງອາຫານໃຫ້ໄດ້ດີ ແລະ ສາມາດ
ແກ້ຈຸດອ່ອນສະເພາະຂອງບາງກຸ່ມຄົນທີ່ຂາດແຄນເຂົ້າກິນ ແລະ ທຸກຍາກ ໃນສັງຄົມ ລາວ ໃນເຂດຫັນນະຍິດ
ຫ່າງໄກສອກຫຼີກ ແລະ ບ່ອນທີ່ມີຄວາມສ່ຽງແມ່ນກຸ່ມຄົນທີ່ຢູ່ໃນຕົວເມືອງ ເຊິ່ງ ຄ່າໃຊ້ຈ່າຍສະບຽງ ອາຫານ

(ເຂົ້າ) ແພງຫຼາຍ. ການຜະລິດ ເຂົ້າຈະເຫຼືອກິນກໍ່ຕາມແຕ່ຍັງບໍ່ທັນ ຕອບສະໜອງໄດ້ຄວາມຮຽກຮ້ອງຕ້ອງການ ທາງໂພສະນາການທີ່ສົມບູນ. ເຊິ່ງສອດຄ່ອງກັບຜົນຂອງ ການສຶກສາທີ່ສ້າງເກດເຫັນສະພາບການຂາດອາຫານ ໃນບັນດາແຂວງທີ່ມີເຂົ້າເຫຼືອກິນໃນ ສປປ ລາວ ແລະ ກໍ່ໄດ້ຢັ້ງຢືນໃຫ້ເຫັນແຈ້ງຕື່ມອີກວ່າມີການຂາດ ໂພສະນາການໃນບາງເຂດຂອງໂລກທີ່ຜະລິດ ສະບຽງ ອາຫານເຫຼືອກິນ ເຊັ່ນຕົວຢ່າງ: ເຂດປາກແມ່ນ້ຳຂອງ ໃນປະເທດຫວຽດນາມ.

ທາງເລືອກໃນການປັບປຸງນະໂຍບາຍດ້ານຜະລິດເຂົ້າ

ຂໍ້ສະເໜີແນະນຳກ່ຽວກັບນະໂຍບາຍການຄ້າເຂົ້າແມ່ນເພື່ອດັດປັບນະໂຍບາຍທີ່ມີໃນປັດຈຸບັນ. ສ້ວນລວມປະກອບມີ (I) ອຳນວຍຄວາມສະດວກໃຫ້ການຄ້າ (II) ປັບປຸງຄ້ວ ແຮສະບຽງ ແລະ ແນວພັນໃຫ້ເຂັ້ມແຂງ (III) ປັບປຸງການລົງທຶນຂອງລັດໃຫ້ມີປະສິດທິຜົນ ແລະ (IV) ປັບປຸງຂະແໜງການຜະລິດ ແນວພັນ ເຂົ້າໃຫ້ເຂັ້ມແຂງ.

ອຳນວຍຄວາມສະດວກໃນການຄ້າເຂົ້າເປືອກ ແລະ ເຂົ້າສານ:

ສປປ ລາວ ມີຊາຍແດນຕິດກັບ 2 ປະເທດທີ່ສ້ວເຂົ້າອອກລາຍໃຫຍ່ຂອງໂລກຄື: ປະເທດໄທ ແລະ ຫວຽດນາມ. ສອງປະເທດນີ້ກໍ່ເປັນປະເທດທີ່ຜະລິດ ແລະ ສ້ວອກເຂົ້າໜຽວ. ພວກເຫີ່ນ ມີການແຂ່ງຂັນດ້ານໂຮງສີເຂົ້າສູງ ແລະ ມີພື້ນຖານການຄົມມະນາຄົມຂົນສ້ວດີ, ເຮັດໃຫ້ການຜະລິດ ເຂົ້າສານມີລາຄາຖືກກວ່າ ສປປ ລາວ. ຂໍ້ຈຳກັດໃນການສ້ວອກເຂົ້າສານຂອງ ສປປ ລາວ ແມ່ນໃນສະເພາະໜ້າແລະໄລຍະຫາງອາດແມ່ນລາຄາເຂົ້າ ສານທີ່ສູງຫຼຸບໃສ່ຄຸນນະພາບ.ໃນເວລາທີ່ຕົ້ນທຶນການຜະລິດເຂົ້າເປືອກຂອງ ສປປ ລາວ ຍັງຕ່ຳກວ່າບັນດາຜູ້ແຂ່ງ ຂັນ ແຕ່ລາຄາແມ່ນເພີ່ມຂຶ້ນຢ່າງໄວ ເມື່ອອອກຈາກໂຮງສີເຂົ້າໄປສູ່ຕະຫຼາດພາກພື້ນ ແລະ ຕະຫຼາດໂລກ ບ່ສາມາດແຂ່ງຂັນໄດ້.ເຂົ້າສານໜ່ວຍຂອງລາວມີບັນຫາຍ້ອນຄຸນນະພາບການສີຕ່ຳຈ່ງເຮັດໃຫ້ຜູ້ຊົມໃຊ້ໃນປະ ເທດໃກ້ຄຽງບ່ດູດດ່ງບ່ຈັບໃຈ. ບັນຫາທຳນອງດຽວກັນນີ້ເກີດຂຶ້ນແລະຈຳກັດທ່າແຮງການສ້ວອກເຂົ້າສານຈ້າວ. ຢ່າງໃດກໍ່ຕາມມີພໍ່ຄ້າໄທແລະຫວຽດນາມແລະບ່ດົນມາປີ້ກໍ່ມີຈີນທີ່ສົນໃຈຢາກນ່ຳເຂົ້າເຂົ້າເປືອກລາວທີ່ມີລາຄາ ຖືກແລ້ວ ຈ່ງໄປສີ ຢູ່ໃນປະເທດຂອງຂອງພວກເຫີ່ນ ເພື່ອນ່ຳໃຊ້ພາຍໃນ ແລະ ສ້ວອກສູ່ຕະຫຼາດສາກົນ.

ໃນເວລາທີ່ມີການລົງທຶນເພີ່ມຂຶ້ນເພື່ອຍົກລະດັບຄວາມສາມາດໂຮງສີຢູ່ ສປປ ລາວ ໃນອຸມປ ຜ່ານມາ, ໂຮງສີເຂົ້າຈ່ານວນຫຼວງຫຼາຍແມ່ນໂຮງສີຂະໜາດນ້ອຍ ແລະ ອຸປະກອນຍັງໃຊ້ກໍ່ບ່ພຽງພໍ ຖ້າຢາກຂ້າມຜ່ານ ຈຸດອ່ອນໃນການສີເຂົ້າເຫ່ົາປີ້ໄດ້ຕ້ອງໄດ້ມີການລົງທຶນຫຼາຍຈາກພາກເອກະຊົນ (ຈາກພາຍໃນ ແລະ ຕ່າງ ປະເທດ) ເພື່ອລົງທຶນໃສ່ໂຮງສີ ແລະ ໂຮງຄັດຂະໜາດໃຫຍ່. ປັດຈຸບນຂອງປະເທດໃກ້ຄຽງທີ່ເກີດຂຶ້ນ ກັບຜູ້ສ້ວເຂົ້າອອກ ເຊັ່ນຢູ່ກຳປູເຈຍ ໄດ້ຊີ້ໃຫ້ເຫັນວ່າ ການປ່ຽນແປງ ໃນຂະແໜງໂຮງສີເຂົ້າຈະເກີດ ຂຶ້ນເມື່ອການຜະລິດເຂົ້າເປືອກຫຼາຍຂຶ້ນ ແລະ ສາມາດ ປ່ຽນຮູບໄປເປັນເຂົ້າສານໄດ້ໃນຈ່ານວນຫຼາຍເພື່ອ ສ້ວອກ. ເພື່ອເຮັດໃຫ້ການຄ້າເຂົ້າເປືອກມີຄວາມ ສະດວກຂຶ້ນ, ທາງເລືອກນະໂຍບາຍທີ່ດີທີ່ສຸດ ຄືຕ້ອງລົບລ້າງການຫ້າມສ້ວອກເຂົ້າ ແລະ ລ້າງການຄ້າທີ່ໂປ່ງໃສ, ລ້າງສະພາບແວດລ້ອມ (ສ້ວອກ) ໃຫ້ແກ່ເຂົ້າເປືອກ ແລະ ເຂົ້າສານ ໂດຍມີລະບຽບການທີ່ຈະແຈ້ງ ແລະ ຕິດຕາມກວດກາໄດ້ງ່າຍ ໃນດ່ານຊາຍແດນ, ອັນນ້ຶອາດຈະບ່ເປັນ ໄປໄດ້ທາງດ່ານການເມືອງໃນໄລຍະສັ້ນ, ອີກບັນຫາໜ່ຶງທີ່ສ່ຳຄັນ ແລະ ດີທີ່ສຸດນັ້ນ ຄືການ ພິຈາລະນາລົບລ້າງພາສີສ້ວອກທີ່ບ່ຄ້ງຕ້ວຢູ່ຂັ້ນສູນກາງ ແລະ ຂັ້ນແຂວງ.

ຮັບປະກັນລ້າງຄ້ງແຮເຂົ້າກິນແລະແນວພັນຢ່າງແຂງແຮງ:

ເປັນພາກສ່ວນໜ່ຶງທີ່ຕິດພັນກັບນະໂຍບາຍດ້ານປະກັນສະບຽງອາຫານລັດຖະບານ ສປປ ລາວ ໄດ້ມີການລິເລີ່ມລ້າງຄ້ງແຮເຂົ້າກິນແຫ່ງຊາດ. ຜົນຂອງການຄົ້ນຄວ້າຄ້ງນ້ຶພົບວ່າ, ຄ້ງແຮເຂົ້າສານອາດໃຊ້ໃນ ເວລາສັ້ນໆເທ່ົານ້ັນຈະເປັນການດີເພາະ ສປປ ລາວ ໄດ້ເຊ່ືອມເຂົ້າຕະຫຼາດເຂົ້າ ໃຫຍ່ປະຈ່ າ ພາກພື້ນແລ້ວ, ນອກຈາກນ້ຶໃນປັດຈຸບັນ, ການມີນະໂຍບາຍຂອງ ສປປ ລາວ ທີ່ສະສົມເຂົ້າ ແຮໄວ້ໃນຈ່ານວນ ຈ່ ກັດນ້ຶຈ່ງ ເຫັນວ່າເປັນການເໝາະສົມເຖິງວ່າຍັງສະສົມບ່ໄດ້ຕາມເປ້ົາໝາຍທີ່ວາງໄວ້ຕ້ວຈ່ິງກໍ່ຕາມ. ເພື່ອສ້າງຄວາມ ເຂັ້ມແຂງໃນຂອງເສ ົ້າຄ້ໍາໃຫຍ່ຂອງໂຄງການຄ້ງແຮເຂົ້າ ສປປ ລາວ ຄ້ງແຮສຸກເສີນແນວພັນ ແລະ ເຂົ້າເປືອກ

ເພື່ອຊ່ວຍ ປະຊາຊົນທີ່ຖືກກະທົບຈາກໄພທຳມະຊາດ ແລະ ເລັ່ງໃສ່ການຊ່ວຍເຫຼືອດ້ານສະບຽງອາຫານ/ຕາບ່າງຄວາມປອດໄພໃນກຸ່ມທີ່ມີຄວາມສ່ຽງ-ອາດຈະເປັນນະໂຍບາຍຂອງລັດຖະບານທີ່ດີເພື່ອບັນລຸເປົ້າໝາຍທາງ ການເມືອງ.

ປັບປຸງປະສິດທິຜົນ ແລະ ປະສິດທິພາບຂອງພາກການລົງທຶນ:

ເພື່ອປັບປຸງປະສິດທິຜົນຂອງການອະນຸມັດງົບປະມານໃຫ້ແກ່ຂະແໜງກະສິກຳ.ການສຶກສາໄດ້ສະເໜີແນະໃຫ້ມີການດຸ່ນດ່ຽງໃນການຈັດແບ່ງລົງທຶນຂອງລັດເພື່ອສຸມໃສ່ການສົ່ງເສີມ,ການຖ່າຍທອດຄວາມຮູ້ແລະການພັດທະນາເຕັກໂນໂລຊີ (ລວມທັ້ງແນວພັນທີ່ດີ) ແລະຊັບລະປະທານ.ການວິໃຈຊີ້ບອກວ່າການລົງທຶນໃສ່ຊັບລະປະທານ ແມ່ນໜວງໜາຍແຕ່ການຍົກ ຜະລິດຕະພາບ ແລະ ລາຍຮັບແມ່ນ ໄດ້ມາຈາກການສົ່ງເສີມທີ່ດີ 60-80% ຂອງຊັບຜະລິດ, ປັດໃຈໜຶ່ງຂອງການລົງທຶນຄັບຊຸດແມ່ນຕ້ອງມີແນວພັນ (R3) ທີ່ດີ ບວກກັບການສົ່ງເສີມທີ່ດີ ແລະ ເຂົ້າເຖິງຝຸ່ນປຸ໋ຍ. ຂະແໜງການເມັດພັນຢູ່ ສປປ ລາວ ພົບກັບສິ່ງທ້າທາຍຫຼາຍປະການ. ເພື່ອ ລັບມີກັບ ສິ່ງທ້າທາຍເຫຼົ່ານີ້ມີຄວາມຕ້ອງການຕ້ອງໄດ້ແບ່ງງົບປະມານ ຂອງລັດໃຫ້ແກ່ການຜະລິດແນວພັນ ໃນທຸກລະດັບ ພ້ອມທັ້ງສ້າງລະບົບການຜະລິດແນວພັນເຂົ້າໃຫ້ເຂັ້ມແຂງ ແລະ ສະໜັບສະໜູນລະບົບ ແຈກຢາຍແນວພັນຂອງເອກະຊົນ.

ວາງມາດຕະການເພື່ອສ້າງໃຫ້ຂະແໜງແນວພັນເຂົ້າເຂັ້ມແຂງ:

ກ່ອນອື່ນໝົດຕ້ອງກວດຄືນຢ່າງຈິງຈັງລະບົບການຜະລິດແນວພັນເພື່ອກຳນົດວ່າຄວນປັບປຸງ ແກ້ໄຂ ຢູ່ບ່ອນໃດ. ການກວດກາຄືນຢ່າງໜ້ອຍແມ່ນປະກອບດ້ວຍຂັ້ນຕອນດັ່ງຕໍ່ໄປນີ້: (I) ກຳນົດທາງເລືອກເພື່ອປັບປຸງ ການວາງແຜນ ແລະ ການປະສານງານລະຫວ່າງສະຖາບັນຄົ້ນຄວ້າ ກະສິກຳ ແລະ ປ່າໄມ້, ກົນຈັກຝັ່ງ, ກົນສົ່ງເສີມ ແລະ ສະຫະກອນ ເພື່ອກຳນົດພາລະບົດບາດ ແລະ ໜ້າທີ່ທີ່ພົວພັນກັບ ການຜະລິດແນວພັນ ໃຫ້ແຈ້ງ, ການກວດກາຄຸນນະພາບ ແລະ ການສົ່ງເສີມ (II) ກວດຄືນໂດຍວາງຄາດໝາຍ ໄວ້ວ່າ ຕ້ອງໄຊ້ຄວາມສາມາດສູງສຸດ ແລະ ປັບປຸງປະສິດທິພາບ ຂອງການນຳໃຊ້ທຶນຮອນຂອງລັດ ແລະ (III) ຈຳແນກທາງເລືອກເພື່ອດຶງດູດເອົາພາກສ່ວນເອກະຊົນ (ທັງພາຍໃນ ແລະ ຕ່າງປະເທດ) ເຂົ້າຮ່ວມ ໃນການຜະລິດແນວພັນເຂົ້າຢູ່ ສປປ ລາວ.

ປະການທີສອງມີຄວາມຈຳເປັນຕ້ອງສ້າງຕັ້ງອົງການໃດໜຶ່ງເພື່ອປະສານງານ ແລະ ແລກປ່ຽນ ຂໍ້ມູນຂ່າວສານໃນວຽກງານການສະໜອງ ແລະ ຄວາມຕ້ອງການແນວພັນ. ອັນທີໜຶ່ງຕ້ອງສ້າງຕັ້ງ ຄະນະແນວພັນແຫ່ງຊາດ ແລະ ກອງເລຂາ (ບໍ່ຈຳເປັນຈະຢູ່ປະຈຳ) ຄະນະແນວພັນນີ້ອາດຕັ້ງຢູ່ໃນ ກົມແຜນການ ກະຊວງກະສິກຳ ແລະ ປ່າໄມ. ຈຸດປະສົງສ້າງຕັ້ງຄະນະແນວພັນນີ້ຂຶ້ນ ແມ່ນເພື່ອມີ ຈຸດປະສານງານທີ່ເປັນເອກະພາບເພື່ອປະຕິບັດຈຸດປະສົງ ແລະ ເປົ້າໝາຍຍຸດທະສາດ ພັດທະນາຂອງ ລັດຖະບານໃນຂະແໜງການເຂົ້າ.

ປະການທີສາມແມ່ນມີຄວາມຈຳເປັນໃນການແບ່ງປັນທຶນຮອນຂອງລັດເຂົ້າໃສ່ການຜະລິດ ແນວພັນ ໃນບໍລິມາດອັນຈຳເປັນ, ສາມາດຄິດໄລ່ໄດ້ອີງຕາມເປົ້າໝາຍຍຸດທະສາດຂອງການ ຄ້ຳປະກັນ ສະບຽງອາຫານ ຂອງຊາດ ແລະ ການສົ່ງອອກ. ຂໍ້ສະເໜີໃຫ້ລັດຖະບານແບ່ງປັນງົບປະມານ ຄາດໝາຍປະມານ 300-350 ໂຕນ (ຂຶ້ນກັບລະດັບທະວີຄູນ) ຮອດ 2015 ເຊິ່ງພຽງພໍສຳລັບແນວພັນ ລຸ້ນ 3 ຢ່າງນ້ອຍຜະລິດໃນເນື້ອທີ່ນາ 175,000 ເຮັກຕາ ນີ້ຈະເຮັດໃຫ້ການຜະລິດ ແລະ ອັດຕາການປ່ຽນແນວພັນເຂົ້າຢູ່ ສປປ ລາວ ໄກ້ຄຽງກັບປະເທດເພື່ອນບ້ານ.

ສຸດທ້າຍຂໍ້ສະເໜີໃຫ້ມີການສະໜັບສະໜູນຊ່ວຍເຫຼືອໃຫ້ແກ່ພາກເອກະຊົນເຂົ້າຮ່ວມໃນລະບົບແຈກ ຢາຍແນວພັນໃນການຈຳໜ່າຍພັນເຂົ້າລຸ້ນ 3 ທີ່ຜະລິດຈາກສະຖາບັນແນວພັນ ແລະ ກຸ່ມຜູ້ຜະລິດແນວພັນ. ເຊິ່ງອາດຈະຫັນເອົາສະຖານີຂອງລັດໃດໜຶ່ງໃຫ້ ເອກະຊົນເຮັດຫົດລອງເພື່ອ ພັດທະນາ ການແຈກຢາຍ ແນວພັນໂດຍຜ່ານຕາບ່າງຂອງການຂາຍຍົກ ແລະ ຂາຍຍ່ອຍ.

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EXECUTIVE SUMMARY

Background and Context

The results of this study confirm the continuing structural transformation of the Lao rice sector which started a decade ago. To some extent, the sector transformation is being led by inter-related factors not strictly related to government rice sector policies, including: (i) continued GDP growth led by mineral and hydropower exports; (ii) increasing job opportunities in the non-tradables, non-agricultural sector, and in neighbouring countries, associated with increasing incomes; (iii) increasing shortages of farm labour and an ageing farm population; (iv) increasing urbanization and related changes in food consumption patterns; and (v) stabilization of aggregate national rice consumption as a result of a declining population growth rate and gradual diversification of diets away from rice as a source of calories. Furthermore, emergence of new private sector-driven export crops (i.e. most notably coffee, rubber, bananas, maize and cassava) has motivated rice growers to shift cultivation towards other crops (or at least reduce the area under rice and produce rice only for household consumption).

The current situation, which decouples rice sector-related government policies between farm and post-farm, each governed by different sector line ministries (with somewhat conflicting goals), may no longer be efficient. The growth in the number of commercially-oriented rice farmers as shown by the 2010 Agriculture Census data means that investments in further productivity improvements need to be well articulated with measures to sustain a sound market environment and this has trade policy implications.

Policy Framework

There are three main policy reference documents that provide a strategic framework for the rice sector: (i) the Political Report of the 8th Party Central Committee to the 9th Party Congress in 2011; (ii) the Seventh National Socio-Economic Development Plan (NSEDP) 2011–2015; and (iii) the Agricultural Development Strategy (ADS) 2011–2020 with an associated Agricultural Master Plan (AMP), which provides a roadmap for the implementation of the ADS. The AMP proposes a framework of measures and interventions that various agencies

would need to undertake at the national, provincial and district levels in order to achieve the 2015 goals of the ADS. The related Agricultural Investment Plan (AIP) provides the framework of financial measures associated with the AMP. As such, the AIP is a main vehicle for discussing the funding of AMP within the Government of the Lao PDR but primarily with development partners.

The Political Report recognizes the importance of agriculture and forestry as "a fundamental sector of our national economic structure" and calls for a fundamental transformation of the rice industry in the Lao PDR, to modernize the sector, making it more productive and market-oriented. The NSEDP seeks to achieve sustainable economic growth and reduce poverty. The ADS has as its primary goal by 2015 to achieve food security in order to meet the requirements for calorie intake, especially in remote rice deficit areas.

To achieve these goals, there is no one consistent rice policy but rather a number of policies in place that use various instruments. This has intricate implications for the rice sector. The group of policies that do not require budget transfers are mainly trade relatedand include mainly policies on export bans; to some extent they also include tax concessions as agriculture is not subject to the same level of direct taxes as other sectors of the economy. The policies that do require budget allocation regard those directly benefiting individual farmers (seed, electricity, subsidized credit, extension support). Policies which benefit agricultural producers collectively regard research in rice seed and rice nutrient management.

Rice Sector Performance

Following a significant expansion in production area and an increase in productivity of rice during the 1990s, the country has been producing a stable and increasing rice surplus over the last decade. Adoption of improved rice varieties was the single most important factor in achieving significant productivity increases. With expanding production, the Lao PDR has achieved rice self-sufficiency at the national level. At the regional level, however, there are differences in self-sufficiency among the provinces, with the major rice deficit provinces being in the north of the country.

Although productivity gains have been achieved, major constraints continue to exist, including a weak extension service and difficulties in accessing farm credit. There are practical constraints affecting post-

harvest operations and rice quality, on-farm storage, and the structure and performance of the milling sector. Rice milling is mainly done at the village level by small mills with insufficient equipment: average milling rates are low. At the policy level, inconsistencies in government policy concerning cross-border trade limit an expansion of the rice sector.

The results from farm model analysis suggest that low input/low output rice farming households are not able to obtain sufficiently high incomes (or returns on labour), thereby limiting their incentive to respond to planned government investments in the rice sector and government policy goals in general. Data from the 2010–2011 Lao Agriculture Census show how the proportion of households growing rice has decreased from 77 percent of all households in 1998/99 to 71 percent in 2010/11. Rice production is becoming increasingly concentrated in regions with a natural comparative advantage, such as the plains in the south.

A detailed simulation analysis was undertaken for alternative scenarios of rice production, rice consumption, and resulting balance of exportable rice surplus between 2012 and 2020. Considerations were given to a wide range of variables, including projections in the expansion of area and growth of rice yields, post-harvest losses, milling rates, non-food consumption of rice and demographic change (i.e. population growth and degree of urbanization, per capita rice consumption).

The results show that the Lao PDR would continue to build a robust national rice surplus even under the most conservative assumptions of changes in demographic parameters and production/productivity growth. They demonstrate that the Lao PDR's exportable surplus of rice will continue to build at a robust rate even when assuming modest production growth and conservative demographic change. The exportable surplus is expected to reach 0.45–0.5 million tonnes by 2015 (from the current 0.3 million tonnes) under the base case production scenario.

Emerging Challenges

As the Lao rice sector has moved from deficit to surplus production and is going through a profound transformation both at the consumption and production levels, the current policy mix may no longer be optimal for achieving the key government objectives of food security and economic growth. There are several opportunities for improving the current policies through more coordinated actions

regarding rice sector support policies and more efficient resource allocation in the case of budget transfers to rice producers.

The Lao PDR has reached the point where food security (including nutrition) is no longer a single function of increasing the rice surplus. As the country moved from a rice deficit to a sizable rice surplus, and caloric intake from rice increased significantly, the nutritional deficit shifted from rice to other foodstuffs in many situations. Rice shortages as a source of food insecurity are becoming an increasingly localized phenomenon. The broader focus of food security would require addressing issues related to nutritional deficits rather than a shortage of rice. The current approach of using mainly one policy instrument (essentially trade policy focused on keeping domestic rice prices low) to address such emerging food security challenges may not be optimal in a situation of an increasing rice surplus.

Food security strictly measured as access to rice is no longer a major problem in an aggregate (national) sense, but rather a localized problem mainly in upland areas. Moreover, while the Lao PDR is vulnerable to extreme climatic events, the analysis shows that the expansion of rice production and the localized nature of most climatic events mean that even with floods and droughts the Lao PDR is able to produce enough rice for its needs at national level, and still produce a surplus that can be exported. The corollary is that food security support programmes related to rice availability only need to target specific groups and locations and need to include built-in safety net and disaster preparedness elements.

Improving nutritional outcomes will increasingly be dependent on policies that promote higher household incomes, and education on and awareness of better uses of foodstuffs, and that are able to tackle the specific constraints of particular population groups in Lao society, namely food (rice) deficit groups in remote rural locations and the poorer and more vulnerable segments of the urban population that incur a relatively high expenditure for food (rice). Rice production and surpluses are not a sufficient condition for attaining good nutritional outcomes. This is consistent with observations of poor dietary diversity in high surplus provinces in the Lao PDR and also with evidence of high malnutrition rates in some of the highest surplus-producing regions in the world, such as Viet Nam's Mekong River Delta.

Options for Improving Rice Sector Policies

The proposed policy recommendations seek to adapt the current policy mix to meet the challenges that the rice sector faces. They include: (i) facilitating trade, (ii) strengthening rice seed and food reserves, (iii) improving the efficiency and effectiveness of public investments and (iv) strengthening the rice seed sector.

Facilitate trade in paddy and rice. The Lao PDR borders on two of the largest rice-exporting countries in the world (Thailand and Viet Nam). Both of these nations are also significant producers and exporters of glutinous rice. They also have highly competitive milling and transport infrastructures, which makes their milled rice cheaper compared with that of the Lao PDR. The main constraint for the export of Lao milled rice in the short and medium term would be the high cost of milled rice relative to its quality. While the Lao PDR still has lower production costs of paddy than its competitors, its rice prices become increasingly uncompetitive as the rice is priced ex-rice mill, and is delivered to the regional markets or overseas destinations. Lao milled rice suffers mainly from low milling quality, which makes it unattractive to consumers in the neighbouring countries. These same issues would also affect the potential export of non-glutinous rice. However, there is interest from Thai and Vietnamese traders, and more recently from the Chinese, to import cheaper Lao glutinous paddy, which could be milled in their countries and sold on domestic or international markets.

While there has been increasing investment in the milling capacity in the Lao PDR over the past years, a vast majority of the commercial mills are still small and operate with obsolete milling equipment. Overcoming milling constraints would require significant private sector investments (from domestic or foreign sources) in large modern mills and polishing factories. Experiences from neighbouring, emerging rice exporters, such as Cambodia, show that such changes in the milling sector will occur once the Lao PDR starts to produce a sizable surplus of paddy, which potentially could be turned into milled rice exports. In order to facilitate trade in paddy, the first best policy option would be to eliminate export bans and create a transparent trade (export) environment for both rice and paddy, with clear and easily monitored rules at the border. Should this not be politically feasible in the short run, a second best approach that might be considered is to substitute all bans at central and provincial levels with an indexed variable export tax.

Strengthen emergency rice seed and food reserves. As part of the current food security-related policies, the Government of the Lao PDR has started a pilot national rice reserve programme. The analysis conducted in this study indicates that buffer stocks would be effective for only a short period of time at best, given the Lao PDR's integration with larger regional rice markets. Furthermore, their effectiveness is contingent upon closure of the border/trade restrictions that has proven difficult to enforce in practice. Thus, the current Lao policy of having limited buffer stocks seems reasonable although it may not be able to achieve its intended objectives in reality. Focusing on strengthening the other two pillars of the Lao rice reserve programme – emergency rice seed and paddy reserves for those portions of the population affected by natural disasters and a targeted food aid/safety net for vulnerable groups – may be a better way for achieving the government's political objectives.

Improve the efficiency and effectiveness of public investments. In terms of improving the efficiency of the allocation of budgetary funds to agriculture, the analysis suggests a need for a more balanced approach to allocating scarce public resources to extension activities, technology development and transfer (including good seed), and irrigation. The simulations performed show that, while investments in irrigation are an important component of a comprehensive investment package, the highest incremental production volumes and returns on public spending come from "best practice" extension packages, which contribute 60–80 percent of total incremental paddy production depending on the scenarios. The key component to this investment package is availability of good quality R3 seed, along with functioning extension and access to fertilizer. The seed sector in the Lao PDR, however, faces significant challenges. Addressing these challenges requires the allocation of dedicated government funding for seed multiplication, as well as necessary institutional reforms that improve the efficiency of seed production systems at all levels and encourage establishment of a viable private sector-driven seed distribution system.

Take measures to strengthen the rice seed sector. First, a rigorous institutional review of seed production systems should be conducted to identify areas for reorganization. The review would involve at a minimum the following steps: (i) identify options for improved planning and coordination of the work between NAFRI, DoA and NAFES and clarify their functions as they relate to seed production, quality control and extension; (ii) review and rationalize the strategic role of

various seed production stations with the aim of maximizing capacity utilization and improving efficiency in the use of public funds; and (iii) identify options for private sector involvement (both domestic and foreign) in Lao rice seed production.

Second, there is a need to establish institutional arrangements for effective coordination and exchange information on seed supply and demand. The first step should be the establishment of a national seed board (NSB), and related secretariat (which would not be a statutory body). The NSB could be located within the Department of Planning of MAF. The objective of establishing the NSB would be to have a single coordination unit to meet the government's strategic rice sector development objectives and targets.

Third, there is a need to provide designated public funding for the production of a core volume of seed, which would be determined based on the strategic targets for national food security and rice exports. It is suggested that the government allocate annual funding for core seed production (BS, R1, R2 seeds) at the target level of about 300–350 tonnes (depending on the multiplication factor) by 2015, which would allow enough R3 for at least 175 000 ha of lowland paddy rice. This would put the Lao seed renewal rate closer to that of its neighbours.

Finally, it is recommended that support and encouragement be given to the development of a private seed distribution system for the sale of R3 seed that is being produced by seed stations and farmer groups. This could include on a pilot basis the privatization of some seed stations, which should then develop seed distribution through the networks of wholesale and retail agents.

1. Introduction

This study is an initiative of the Government of the Lao PDR and, in particular, the Ministry of Agriculture and Forestry (MAF). The objective was to produce an analytical paper to support evidence-based policy decisions regarding the rice sector. Most importantly, it sought to provide a useful contribution to the Government of the Lao PDR in its design of a rice sector policy for the country. This study is considered a first step in defining a comprehensive food security policy for the Lao PDR. It has benefited from the collaboration between the World Bank, the Food and Agriculture Organization of the United Nations (FAO) and the International Rice Research Institute (IRRI).

Rice is a key staple in the Lao PDR, as in most of the region, and as such is an important element of food security. Moreover, the rice sector in the country has seen impressive development over the last ten years. However, *the sector has reached a crossroads where further progress requires changes to the current policy mix in order to sustain sector growth and support the ongoing transition from rice subsistence to rice commercialization that is required to achieve the government policy targets*. This study suggests at least three reasons for supporting such an argument.

First, following a significant expansion in production area and productivity of rice in the 1990s, the country has been producing a stable and increasing surplus over the last decade. The current situation decouples rice-related government policies between farm and post-farm, which are governed by different sector line ministries (with somewhat conflicting goals). It may no longer be efficient. In fact, the growth in the number of commercially-oriented rice farmers, as shown in the recently released 2010–2011 Lao Agriculture Census data, means that investments in further productivity improvements need to be well articulated with sustaining a sound market environment, which may have trade policy implications. There is already significant trade with Viet Nam and Thailand and increasing trade with China, which is mostly informal and is not necessarily captured by export statistics. Based on the analysis conducted for this study, if the annual export of rice were assumed to be around 100 000 tonnes of Lao paddy (a conservative estimate), paddy export would represent around USD

30 million in export value. This shows that currently rice is not only an important export commodity for the Lao PDR but also a commodity with a high labour content (unlike minerals or hydropower).

Second, the emergence of new private sector-driven export crops (i.e. most notably coffee, rubber, bananas, maize and cassava) has motivated a shift of rice growers towards producing other more profitable crops (or at least reducing area under rice and producing for household food consumption only). There are also an emerging labour shortage and resulting increase in the cost of farm labour as a result of the ongoing shift of farm labour to non-farm sectors, which has implications for the competitiveness of traditional rice production systems. Our analysis suggests that currently prevalent low input/low output rice farming systems may no longer be competitive vis-à-vis alternative employment opportunities. There will be a need to achieve higher returns/income from rice farming if government wants farmers to respond to its policy goals of expansion in rice production.

Third, the Lao PDR has reached a point where food security (including nutrition) is no longer a single function of increasing the rice surplus. As the country has moved from a rice deficit to a sizable rice surplus, and caloric intake from rice has increased significantly, the nutritional deficits have shifted from rice to other foodstuffs in many situations. Rice shortage as a source of food insecurity is becoming an increasingly localized phenomenon. A broader focus of food security would require addressing issues related to nutritional deficits rather than shortages of rice. The current approach of using mainly one policy instrument (essentially trade policy focused on keeping low domestic rice prices) to address such emerging food security challenges may not be optimal in a situation of increasing rice surpluses.

While many studies have treated the different aspects of the rice sector in the Lao PDR, this study has sought to combine a review of existing secondary evidence with new analysis and technical expertise. It includes among others: (i) a new analysis of household survey data from the Lao Expenditure and Consumption Survey (LECS) 3 and 4 to understand per capita rice consumption trends; (ii) a comprehensive farm-level and miller profitability analysis; (iii) a policy analysis, including a calculation of historical rice producer support estimates (PSEs) as a way to evaluate public sector support policies for the rice sector; and (iv) a scenario analysis for future sector evolution based on various

alternative public investment options, which are evaluated in terms of their relative efficiency.

The study starts with a general overview of trends in rice production and consumption and includes the results of the LECS data analysis (Chapter 2). Chapter 3 focuses on the rice value chain and, in particular, the trends in rice farming profitability, as well as regional rice market integration. Chapter 4 looks at rice sector policies and discusses results from the PSEs. Chapter 5 discusses the scenarios for rice sector evolution based on the current policy mix and under different public investment options. In Chapter 6, the study's key conclusions and recommendations are presented.

2. Lao PDR Rice Sector Performance From Deficit to Surplus

Rice Output Trends

Rice has been a top priority for the Government of the Lao PDR ever since the First NSEDP. National development policies and strategies have emphasized the importance of agriculture in general and rice in particular in achieving food security and stimulating economic growth.

Rice in the Lao PDR, as in much of the region, has been of significant importance since ancient times. Rice is not only associated with cultural traditions in the Lao PDR, but has also been of prime political importance throughout the country's history[1]. According to historical data, during the French colonial period (1893–1945), average unmilled rice production did not exceed 350 000 tonnes annually, with high variability in production (as low as 204 000 tonnes in 1936 and as high as 500 000 tonnes in 1923). According to most accounts, the country was a net rice importer in most of the 1970s and the 1980s, and food availability was particularly vulnerable to extreme climate events such as severe droughts in 1977 and floods the following year. According to Schiller *et al.* (2006), it was precisely in response to such disasters (estimated to have put around half of the country's population at risk of famine) that the government initiated its first attempts to improve rice production and achieve a higher level of rice self-sufficiency.

One of the key policies implemented was the organization of production in cooperatives (the "cooperative movement", 1978–1988), which, despite some tax incentives and preferential credit access during the later stages, actually disrupted production due to a lack of an appropriate set of incentives to motivate farmers to invest in their land. However, in parallel, some policy measures seemed to contribute to improved production, such as the introduction of the first improved seed varieties in the 1970s and, most importantly, the loosening of price controls in the early 1980s, which resulted in improved incentives for producers[2].

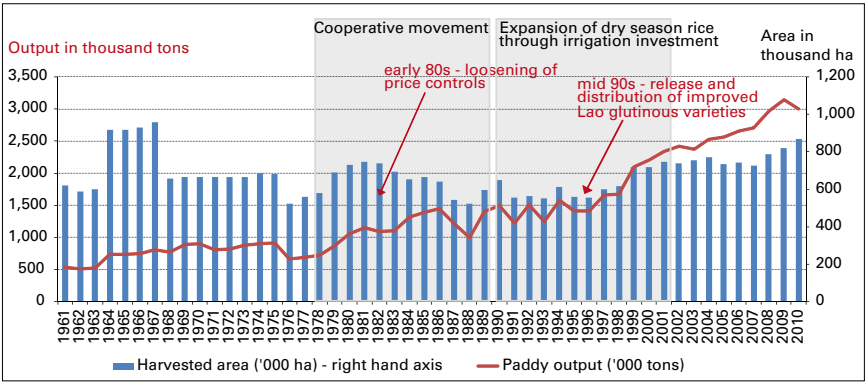
1 For a summary of important historical events regarding rice and the political and economic history of the Lao PDR, see Schiller, Hatsadong, and Doungsila. 2006. A history of rice in Laos (Chapter 2). *In* J.M. Schiller, M. B. Chanphengxay, B. Linquist & S. A. Rao, eds. *Rice in Laos.*

2 According to Schiller *et al.* (2006), the improved incentives led to an immediate 16.5 percent increase in rice production.

By the 1990s, the adoption rate for improved varieties had increased considerably, particularly in the central and southern lowland production systems, reaching some 65-80 percent of farmers in the wet season and 100 percent in the dry season[3]. Many farmers had adopted these new varieties in response to market demand, while continuing in parallel to cultivate traditional indigenous varieties to meet personal and family taste preferences.

As can be seen in FIGURE 1[4], Lao rice production only really started to increase significantly in the 1990s and this occurred along with an expansion of irrigated areas and also an increase in yields mainly due to the scaling up of the use of improved Lao glutinous varieties.

FIGURE 1
Historical evolution of rice production and harvested area, 1961–2011



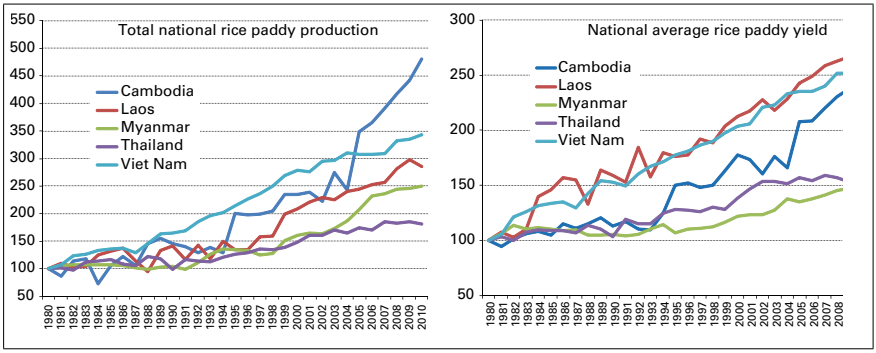
Source: FAOSTAT data from www.fao.org as of August 2012.

Over the last 20 years (1991–2011), Lao rice production has more than doubled (multiplied by a factor of 2.7) to reach around 3.3 million tonnes of paddy in 2011. This represents an average of 5.1 percent annual growth (in compound terms), which is one of the highest in the region. Most interestingly, from 1980 until the present, Lao productivity registered one of the best performances in the region (see FIGURE 2).

3 The adoption rates in Vientiane Municipality,and Khammouane and Savannaketh provinces were 80 percent for wet season and 100 percent for dry season. The adoption rate in Vientiane province was 65 percent for wet season and 100 percent for dry season (PAFES, 2011, and Thasano Seed Center, 2012).

4 The data in the figure is from FAOSTAT. These data slightly differ from the data used later in this report (from MAF) but have been used at this stage because of the comparability with historical time series of data.

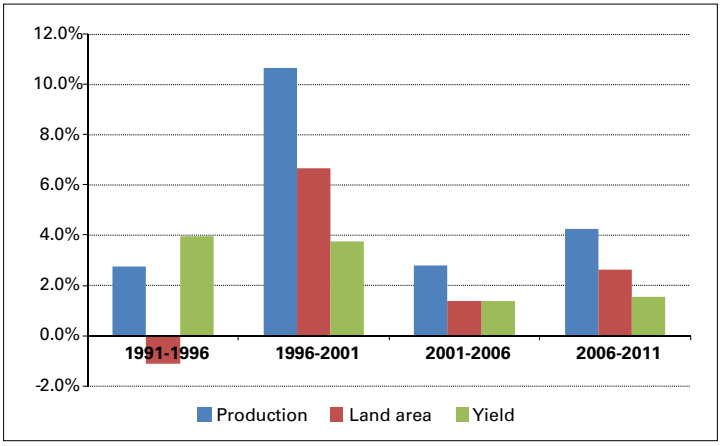
FIGURE 2
Evolution of rice production and yields in regional perspective (1980: basis 100)



Source: FAOSTAT.

The production increase was driven by both improvement in yields and expansion in rice growing areas, in clearly distinct phases. Overall, yield improvement contributed most to the production increase, but this took place essentially until the early 2000s (mainly in the 1996–2001 period). Over the more recent period 2001–2011, however, land expansion accounted for the larger share of the increase in production (FIGURE 3).

FIGURE 3
Growth rates in total paddy rice output, harvested area and paddy yields (compound average annual growth rates in %)



Source: MAF data and the authors' calculations.

In terms of the evolution in productivity, two phases can be identified: (i) a prolonged high yield growth phase from 1991 to 2002 (average yield increased annually at 4.1 percent), which accounted for more than 80 percent of the yield gain during the period 1991–2011 and (ii) a lower yield growth phase between 2002 and 2011, with an average annual compound yield growth of only 0.9 percent. The evolution in productivity seems to be directly linked to the release of improved seed varieties that took place in the mid-1990s. Until then, about 95 percent of the varieties grown in the lowlands were of the traditional kind. By 2002, the peak of the high growth phase for yields in the Lao PDR, an estimated 80 percent of the lowland area in the Mekong River Valley was being planted with improved varieties (data from Linquist *et al.*, 2006). In addition, while there is lack of comprehensive data, increased use of fertilizer also seems to have started during the high yield growth phase: according to survey information from 1995, about 60 percent of the farmers using fertilizer only started applying fertilizer around 1993[5]. Finally, the increase in average annual yield at the national level from 1991 to 2011 also reflects the shift in the relative weights of the production systems, with a significant increase in dry season and wet season lowland rice areas combined with a decrease in upland rice area, where yields were much lower (using 2011 figures, paddy yields in the upland rice area are on the order of 37 percent the level of dry season and 47 percent of wet season lowland production systems).

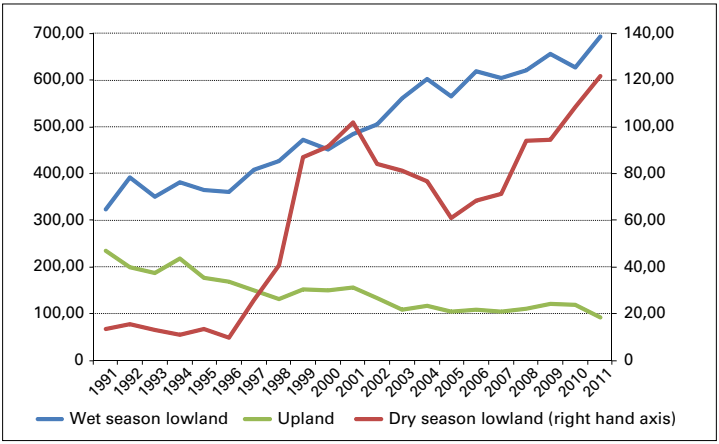
The size of the area dedicated to rice cultivation followed three very different trends depending upon the production system, as can be seen in FIGURE 4: (i) steady increase in the area of the wet season lowland system (representing 77 percent of total paddy production in the Lao PDR in 2011); (ii) steady decrease in the area of the upland system, which was particularly strong between 1991 and 2003 (compound annual average decrease of -6.1 percent); and (iii) very strong increase in irrigated area in the late 1990s and until 2001, followed quickly by a pronounced decrease, and from 2005 onwards, growth, to reach around 120 000 ha in 2011 (about 20 percent more area than the irrigated area in 2001).

Since the mid-1990s, the trends in area expansion followed to some extent government policies, namely that of decreasing area in the "slash-and-burn" system in the upland and of increasing area in irrigated dry season paddy in the lowlands. However, despite significant investments in irrigation, the rice area expansion in the Lao

5 Pandey and Sanamongkhoun, 1998, quoted in Linquist *et al.*, 2006.

PDR during the period 1991–2011 was still mainly driven by an increase in the area in the wet season lowland production system, increasing from around 320 000 ha in 1991 to 690 000 ha in 2011.

FIGURE 4
Paddy harvested area of the wet season lowland system, the dry season lowland system and the upland rice system (ha)



Source: MAF data and the authors' calculations.

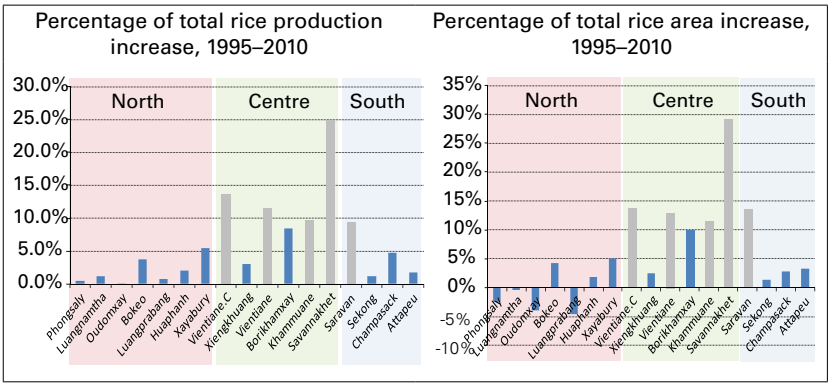
In regional terms, the increase in national rice production was driven by four central provinces, namely Savannakhet, Khammuane, Vientiane and Vientiane Municipality[6], and one province in the south, namely Saravan. Together, this Municipality and these four provinces accounted for 70 percent of the total increase in rice production in the Lao PDR between 1995 and 2010 (FIGURE 5). They also accounted for around 80 percent of the expansion in rice area in the country over the same period, which may indicate some form of competitive advantage in rice production. With the inclusion of Borikhamxay province in the centre and Champasack and Attapeu provinces in the south (which together with the other four provinces make up the Government of the Lao PDR's referenced seven plains[7]), it is estimated that the region would have accounted for more than 80 percent of the country's rice production expansion between 1995 and 2010 (according to MAF data and our calculations). While dry season crop production is

6 Vientiane Municipality can also mean Vientiane Capital or Vientiane City.

7 As regards the area of seven plains production, the provincial boundaries are not the key reference: Vientiane Municipality and Vientiane province are considered as part of the Vientiane plain and the districts in Saravan and Champasack provinces make up the Xedone plain.

almost exclusively concentrated in the seven plains along the Mekong corridor, the expansion in production in these plains was still mainly a result of expansion in the wet season system.

FIGURE 5
Percentage of the total increase in rice production and rice area expansion by province, 1995–2010 (in grey the five provinces that accounted for most of the growth)



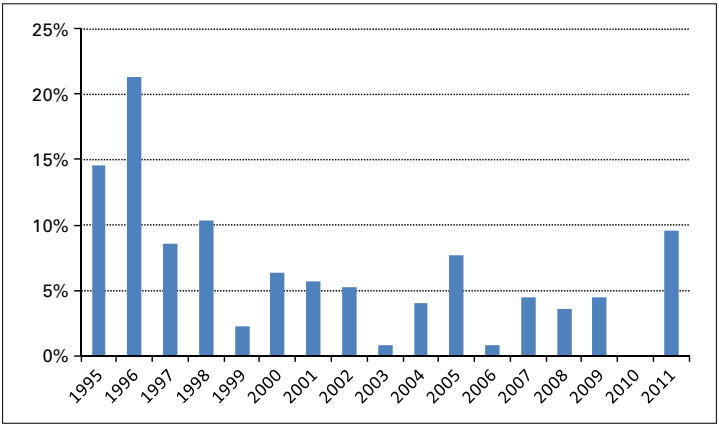
Source: MAF data and the authors' calculations.

Historically, the Lao PDR has seen a high incidence of significant floods and droughts. As indicated above, in 1977 and 1978, severe droughts followed by floods led to famine-like conditions, and also later in 1988 and 1989, severe droughts led to reductions in national production by about a third. According to a review by Schiller *et al.* (2006), "in the 37-year period from 1966 to 2002, for every year, at least part of the country was affected by either drought or flood, or a combination of both". Data from PreventionWeb of the United Nations International Strategy for Disaster Reduction (UNISDR) for the period 1980–2010 indicate that drought, floods and storms represented more than 70 percent of the 30 natural disasters reported for the Lao PDR, with floods being the more common disaster (almost 65 percent probability every year). Data gathered by MAF since 1995 show a similar picture of a regular incidence of floods and droughts in the country (Figure 6). From the data of both UNISDR and MAF on paddy areas affected by extreme natural disasters, it is clear that the rice sector is one of the main sectors impacted by such events. For example, taking data for 2009, which ranked on UNISDR's list as the second most significant year for natural disasters in the Lao PDR in

terms of economic impact[8], rice sector losses accounted for 30–50 percent of total economic damage, depending on the assumptions used.

From a policy perspective, there are two important and related issues to consider regarding the incidence of extreme climatic events on the Lao rice sector. First, the events are mostly regionally localized: data collected by Schiller *et al.* (2006) over the 37-year period indicate that 16 years registered extreme climatic events that impacted more than one region in the country, but only 5 years registered events that impacted all regions. However, during this period, the central and southern regions where most rice is cultivated were those impacted most (32 years registered droughts and/or floods that affected the central region and 22 years registered extreme events that impacted the southern region).

FIGURE 6
Impact of extreme climatic events since 1995 (affected area as % of total cultivated area)



Source: MAF data and the authors' calculations. Data for 2010 is not available.

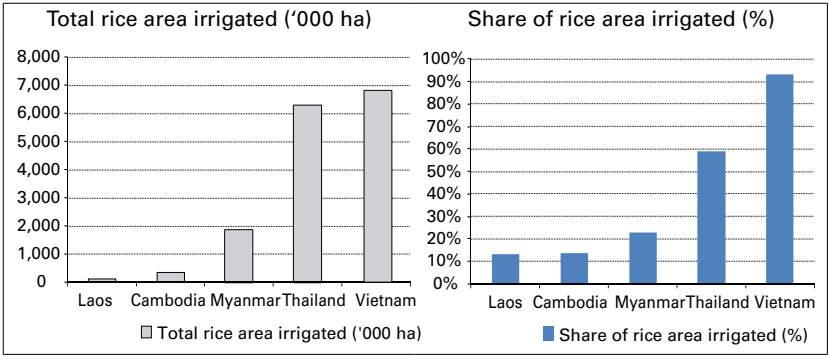
Second, the growth in productivity and expansion of cultivated area have reduced the relative significance of extreme climatic events at

8 Data for 2009 is used, although the one year during the period 1980–2010 in which the greatest economic loss occurred, as per UNISDR, was 1993, for which data on production losses are, however, not available (data only from 1995 onwards). In 2009, UNISDR estimates USD 100 million in losses due to storms. The estimated value of the loss of rice production is based on 2009 average rice retail prices at an average USD/Kip exchange rate, data from MAF on total rice area affected, and a loss of from 60 to 100 percent of rice production in those areas suffering damage.

the national level: during the period 1999–2011, the land area affected by disasters in any one single year has never exceeded 10 percent of the total rice cultivated area. Similarly, this can be illustrated by taking the most significant natural disaster since 1995: in 1996, 115 000 ha were damaged and this corresponded to around 21 percent of the total national rice production area in that year, while it would represent only 14 percent of the area harvested in 2011.

Irrigated land expansion also contributed to lowering the risks associated with rice production in the Lao PDR (namely, risk of crop failure due to drought). From a low of 2 percent of total rice area being irrigated in 1991 in the Lao PDR, the area increased to around 14 percent in 2001 and dropped to 13 percent in 2011. FIGURE 7 shows the percentage of rice areas irrigated in the Lao PDR and neighbouring countries, indicating that in a regional context the Lao PDR has a very low percentage of total irrigated rice area (similar to Cambodia) and depends to a large extent on rainfed agriculture.

FIGURE 7
Total rice area irrigated ('000 ha) and share of rice area irrigated (%) for selected countries



Source: Harvested areas according to FAOSTAT, except for the Lao PDR (uses MAF data); irrigated rice areas according to AQUASTAT; data for the Lao PDR refers to 2011, while data for Viet Nam refers to 2005, for Cambodia and Myanmar to 2006 and for Thailand to 2007. The authors' calculations.

In summary, while the Lao PDR remains a vulnerable country in terms of climatic shocks, the impact of these on food security has moved from being a national phenomenon back in the 1990s to essentially an issue of localized incidence (albeit with possible strong

impact on the livelihoods of those concerned). This has been mainly the result of significant expansion of wet season rice areas. In other words, the significant expansion in wet season rice area and the corresponding increase in production have contributed more towards reducing vulnerability against natural disasters at the national level than investments in irrigation infrastructure. This is because expansion in irrigated areas provides a relatively small incremental production volume of rice to buffer production losses due to natural disasters, given the high investment cost of infrastructure and the fact that it will not protect against flash floods, which has been the primary cause of crop losses in the Lao PDR. Given that extreme natural events in the country are spatially rather confined, the increase in national production through essentially wet season area expansion and yield improvements provides a natural buffer at national level, as demonstrated by the 2011 floods.

Rice Consumption in the Lao PDR – Has It Peaked?

Understanding the trends in Lao rice consumption is a key element in any food security discussion. Rice is the main staple food in the country and concerns over rice availability continue to play a major role in government policies. Moreover, the dynamics of rice consumption are the basis for constructing rice balance scenarios and, consequently, discussing rice sector policies, including expected surpluses, their consequences for domestic prices and the potential for exports.

As suggested by the experience of other countries, which is summarized in Box 1, one would expect per capita rice consumption in the Lao PDR to peak at some point in time and then decline. This rise and fall in consumption would be the result, as indicated by most empirical evidence, of factors such as rising incomes and increasing urbanization, and resulting changes in household dietary habits. The key question is if and how this process is taking place in the Lao PDR, in order to provide guidance on how much total consumption can be expected in the foreseeable future.

BOX 1
Summary of international evidence on trends in per capita consumption

At the global level, Timmer, Block and Dawe (2010) provide an important observation on aggregate rice consumption: the growth rate in per capita rice consumption changed direction in the early 1990s, shifting thereafter to an annual average decrease of 0.11 percent (1990–2008). The authors use different parametric and non-parametric specifications for estimating Engel curve for rice, which suggests a quadratic form with rice moving from a normal to inferior good (which is essentially a good that consumers would demand less of if they had a higher level of real income) in the mid-1990s. In particular, using a econometric (semi-parametric) estimation with the global data, they estimate that rice becomes an inferior good when income per capita exceeds approximately USD 3 570 (in 2000 constant US dollars).

At the national level and for a subsample of Asian countries (including the Lao PDR in some specifications), the authors estimate that rice becomes an inferior good at USD 2 364 per capita GDP, i.e. a lower income level relative to the one estimated using the global data . Most importantly, their analysis indicates very high variability in per capita rice consumption across countries and even across regions within a given country. This results from spatial distribution of incomes, urbanization trends, tastes, etc. In particular, the authors indicate four key factors underlying rice consumption trends: (i) population growth; (ii) income growth and its distribution; (iii) real price changes for rice; and (iv) labour shifts from rural to urban employment as part of structural transformation.

Such findings are also elaborated in older studies such as that of Ito *et al.* (1989), who provide an interesting account of how point estimates of income elasticity of rice consumption for Asian countries decreased in the period 1961–1985 and in some cases became negative. Ito's country list does not include the Lao PDR but rather focuses on countries such as Japan, Thailand, Singapore and Taiwan Province of China, which experienced very high growth in the studied period. Their data suggest that such countries registered major declines in per capita rice consumption as incomes increased. For example, Thailand's per capita rice consumption dropped from an average of 191 kg of milled raw rice in the period 1961–1968 to an average of around 164 kg during the period 1981–1985. In the same periods, Thailand's per capita GDP (in constant 2000 US dollars) increased from around USD 390 (close to the level of the Lao PDR's per capita GDP in 2004) to USD 870. Some countries, such as Japan, and Singapore had even more significant declines of 29 percent and 28 percent, respectively, between the two periods (from 123 kg and 103 kg of rice per capita, respectively, in the earlier period to 88 kg and 74 kg, respectively, in the later period). Japan's and Singapore's economies were growing very quickly between the two periods, with GDP per capita increasing from averages of around USD 11 380 and USD 2 850, respectively, in the 1960s to averages of USD 25 700 and USD 10 880, respectively, in the period 1981–1985 (all data in constant 2000 US dollars).

More recent studies on per capita rice consumption suggest a similar relationship between income per capita and rice consumption. The case of Thailand has been well researched with data from socio-economic surveys which indicate consistent decreases in per capita rice consumption: Isvilanonda (2006) reports that average per capita annual milled rice consumption in Thailand declined from 119 kg in 1990 to 101 kg in 2002, while GDP per capita grew from USD 1 490 to USD 2 040 (in constant 2000 US dollars). Moreover, the survey data also indicate significant differences between (i) rural and urban consumption (in 2002, urban areas consumed 18 percent less rice than rural areas) and (ii) income groups (top 25 percent of income earners consumed 56 percent less rice than the bottom quartile). Jaffee *et al.* (2011) report similar findings for Viet Nam based on the Vietnam Household Living Standards Survey (VHLSS) data: between 2002 and 2008, the country's per capita rice consumption decreased by an average of 1.4 percent annually, with the pace of decline being faster among the urban population (1.7 percent). According to the authors, per capita consumption in Viet Nam fell to around 135 kg per year in 2011 (at a time when per capita GDP was around 25 percent higher than in the Lao PDR) and government actually anticipated that consumption would reach 100 kg by 2020 (according to Food Security Resolution 63/NQ-CP).

Unfortunately, there has been much confusion over rice consumption estimates in the Lao PDR, with figures varying considerably, depending upon the source, mainly as a result of different definitions of per capita rice consumption and of measurement problems (as well as quality of survey data). Given the importance of rice consumption in the Lao PDR and the need for improved data on the subject, these issues are dealt with in Annex 1 of this study. The detailed literature review presented in Annex 1 indicates that between 112 kg and 179 kg of raw milled rice equivalent is being consumed annually by Lao people, depending on the study and methodology. This is clearly a very broad interval and reflects some of the data problems. In particular, an effort is made in Annex 1 to convert all of the estimates to the same units, as often per capita rice consumption in the Lao PDR is confused with household rice needs (including feed, seed, etc.) rather than direct human consumption.

Per capita consumption estimates

Using the latest available FAOSTAT data, Lao people rank as one of the world's highest per capita consumers of rice, with around 163 kg/capita of annual consumption in 2007 (latest year for which data is available – see TABLE 1 and FIGURE 8). Also according to FAOSTAT data, Lao per capita rice consumption decreased by around 2.3 percent between 1993 and 2007, a period when per capita GDP increased by around 90 percent (in constant 2000 US dollars). The FAOSTAT data

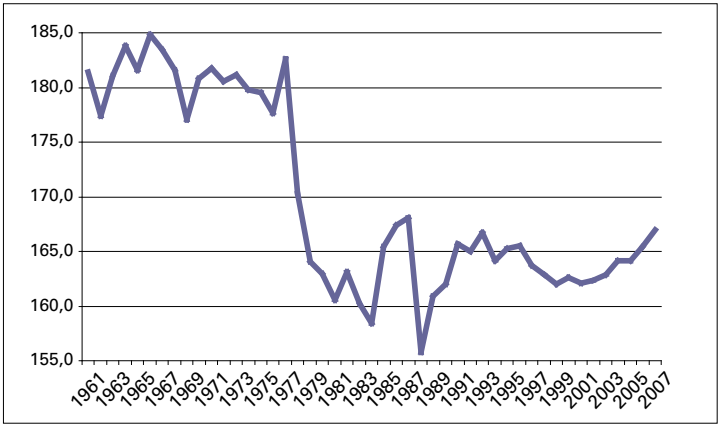
have the advantage of being comparable across countries, but given the way they are calculated (see Annex 1) and comparing values with other studies available (for example, on Viet Nam), they are probably over-estimating consumption.

TABLE 1
Rice consumption in Asian countries (ordered by rate of change between 1993 and 2007)

Country	Kg/person/year (1993)	Kg/person/year (2007)	Rate of change (%)
Malaysia	86.5	76.5	-11.5
Thailand	115.0	103.1	-10.3
India	76.6	70.9	-7.4
Cambodia	163.8	152.2	-7.0
Indonesia	133.8	125.3	-6.3
Lao PDR	166.5	162.6	-2.3
China	78.0	77.5	-0.7
Myanmar	156.0	156.9	0.6
Viet Nam	160.3	165.6	3.3
Philippines	88.3	129.3	46.4

Source: FAOSTAT.

FIGURE 8
Historical per capita rice consumption according to FAOSTAT, 1961–2007 (kg/person)



Source: FAOSTAT.

Using data from the LECS surveys and calculations by FAO (Ramasawamy and Armstrong, 2012), average per capita rice consumption in the Lao PDR would be close to that of FAOSTAT estimates. However, the data would also show a significant increase between LECS 3 and 4 from 145 to 179 kg (TABLE 2), which may indicate broad-based income growth during this period, especially in lower income segments, leading to a relatively larger increase in consumption when compared with declining consumption levels at higher income segments. According to Ramasawamy and Armstrong (2012), this is mainly the result of a significant increase in consumption in rural areas combined with a decrease in urban parts of the country. The absolute figures estimated should be read with care because of issues with data quality. More specifically, the estimates are obtained through the treatment for observations considered outliers, which affects a substantial part (around 10 percent) of the LECS 3 and 4 samples (see Annex 1 for details). Without considering such data adjustments, we obtain very different results, namely: (i) much higher estimates of per capita rice consumption (using data from diary modules) and (ii) a decrease of around 5 percent in per capita consumption between LECS 3 and 4.

The consumption estimates for the rural population in the Lao PDR in 2007/08 presented in Table 2 suggest that rice accounted for 83 percent of average total dietary energy consumption (DEC) (Ramasawamy and Armstrong, 2012), which is extremely high. If one accounts for rural and urban population combined, according to such estimates, rice would move from representing 67 percent of average daily DEC in 2002/03 to 77 percent in 2007/08.

TABLE 2
Urban versus rural per capita rice consumption (kg raw milled rice)

	LECS 3 (2002/03)	LECS 4 (2007/08)	% change
Lao PDR	145.2	179.1	23
Urban	139.8	130.1	-7
Rural	147.1	199.0	35

Source: Ramasawamy and Armstrong, 2012.

The role of incomes and urbanization

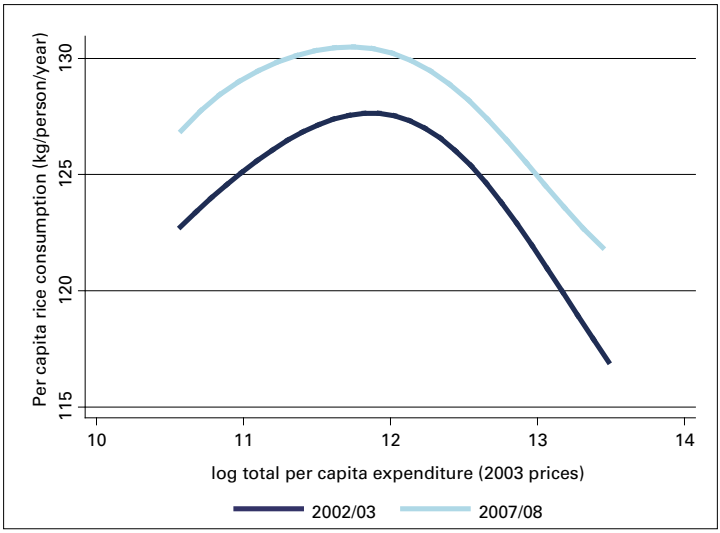
In order to understand the dynamics of Lao per capita rice consumption, we explored the LECS 3 and 4 datasets[9] looking at the roles of income and urbanization.

Regarding income, FIGURE 9 shows the results of a non-parametric estimation of an Engel curve for rice consumption using LECS 3 and 4 and two different types of rice consumption data. Rice consumption refers to both glutinous and ordinary rice combined for each household, with FIGURE 9 using the nutrition module data (i.e. data collected in terms of cooked rice balls), which has been converted to a raw milled rice equivalent, and FIGURE 10 using the expenditure diaries data[10]. While the absolute figures mentioned above are quite different from the ones estimated in Ramasawamy and Armstrong, we are more interested in the relationship between incomes and per capita rice consumption: both types of data show a peak followed by a declining trend, which is more pronounced if the data used are from the nutrition module. *Such a result is in line with most international evidence: it suggests that despite cultural specificities in terms of rice consumption, the Lao PDR can expect to see per capita consumption decline as incomes increase above a certain level*.

9 The analysis was conducted without the data adjustments as in Ramasawamy and Armstrong, 2012: it has excluded outliers in the datasets, as defined by being 2 standard deviations from the mean per capita consumption figures (both for diaries and nutrition module data separately). Details can be found in Annex 1.

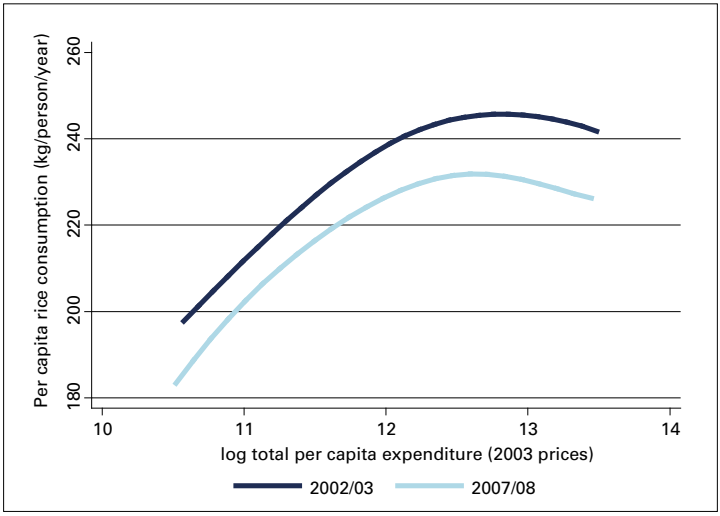
10 Details on the differences in rice consumption measurement by data source are explained in Annex 1. As can be seen, the use of the nutrition module and diary data provides different estimates in the evolution of rice consumption per capita between 2002 and 2007.

FIGURE 9
Total per capita rice consumption and income levels (nutrition module data)



Source: LECS 3 and 4 datasets and the authors' calculations.

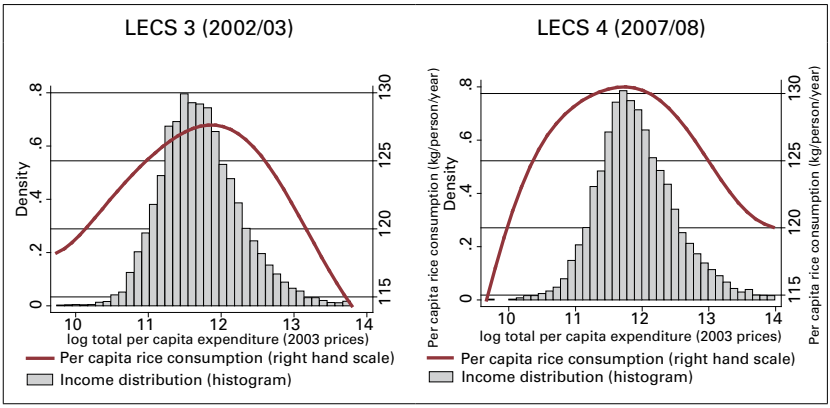
FIGURE 10
Total per capita rice consumption and income levels (diary data)



Source: LECS 3 and 4 datasets, and the authors' calculations.

Next, we would like to know what portion of the population is at each income level and, in particular, on the right and left side of the maximum per capita consumption level as indicated in FIGURE 9 and FIGURE 10. The analysis is presented in FIGURE 11, which uses only the nutrition module data (same data as used in FIGURE 9), splits them into 2002/03 and 2007/08 and overlaps the estimated Engel curves with the income distribution. It suggests two propositions: (i) in both periods, a significant portion of the population was already located past the maximum rice per capita consumption level and (ii) from 2002/03 to 2007/08, this effect became even more pronounced. The latter can be seen from the larger share of observations that lie to the right of the income level correspondent to the maximum rice per capita consumption level in 2007/08 relative to 2002/03.

FIGURE 11
Per capita rice consumption and income distribution in 2002/03 and 2007/08 (nutrition module data)



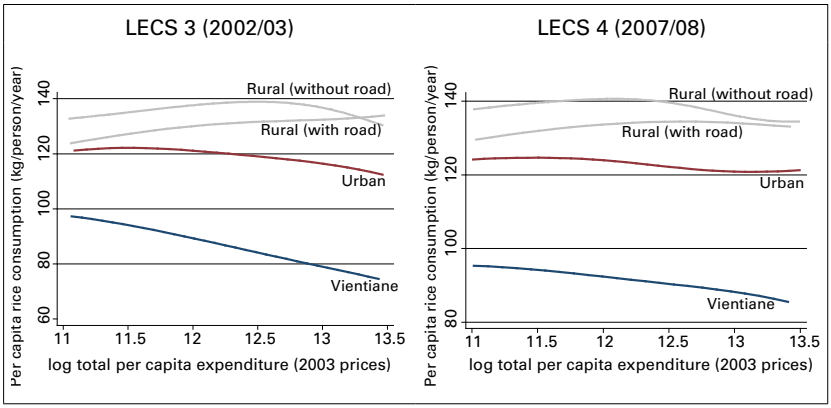
Source: LECS 3 and 4 datasets and the authors' calculations.

Regarding the impact of urbanization, FIGURE 12 shows a similar non-parametric estimation of per capita rice consumption but for different locations in the Lao PDR: (i) Vientiane, (ii) other urban areas, (iii) rural areas with road access and (iv) rural areas without road access. The rice consumption data used is from the nutrition module in LECS 3 and 4 and again it includes both glutinous and non-glutinous rice combined, as well as converted into annual number of kilograms per person.

The analysis raises two key propositions: (i) there is a strong urban effect on rice consumption: both in 2002/03 and 2007/08, Vientiane and other urban areas show lower per capita rice consumption

relative to rural areas and (ii) in urban areas, there is a greater decline in per capita rice consumption with increasing income level. Using expenditure diaries data rather than nutrition module data (see details on differences in Annex 1), the analysis confirms again a much lower per capita consumption level in Vientiane relative to other areas but it does not show as much of a decline in consumption with increasing income level in rural areas.

FIGURE 12
Per capita rice consumption and urbanization in 2002/03 and 2007/08 (nutrition module data)



Source: LECS 3 and 4 datasets and the authors' calculations.

Overall, the results suggest that it is the urban non-poor that are driving lower per capita consumption. As an approximation, we show in TABLE 3 the poor and non-poor in 2002/03 and 2007/08 by urban and rural area. The results indicate that the urban non-poor (who consume less rice per capita) are the fastest increasing segment of the Lao population: from 18 percent of total population in 2002/03 to 24 percent in 2007/08 (accounting for all urban non-poor as per respective poverty lines). This is consistent with data from census and population trends in the Lao PDR as per National Bureau of Statistics (more on this issue in the sections below).

TABLE 3
Urban versus rural poor and non-poor rice consumption in 2002/03 and 2007/08 (breakdown in % of total population)

	LECS 3		LECS 4	
	Non-poor	**Poor**	**Non-poor**	**Poor**
Urban – Vientiane	7.43	1.38	6.39	1.15
Urban – Others	11.02	3.15	17.43	3.85
Rural (with road)	37.82	18.97	43.1	18.29
Rural (without road)	10.22	10.01	5.5	4.29

Source: LECS 3 and 4 datasets and the authors' calculations.

Finally, we have also looked to see which factors can be most easily associated with per capita rice consumption; in particular, we looked at income and location. To create a simple statistical association, we use a linear regression model with per capita rice consumption as dependent variable and a number of control variables including dummies for income quintiles, urban versus rural, altitude, proximity to border and region (northern, central, southern or Vientiane). The analysis from the regressions, using pooled LECS 3 and 4 data as well as each of the datasets individually, is shown in TABLE 4. Most of the control variables are statistically significant at the 1 percent level and coefficients have the expected signs. The results suggest that location effects (in Vientiane, the northern region and the central/southern regions) are more important than belonging to different income quintiles. Looking at the LECS 4 data regression, the results suggest that an average person in the northern region of the country would consume over 40 kg more milled rice per year when compared with a person living in Vientiane. Location also seems to have an effect, although not as major, on inhabitants living in the central or the southern regions: they consume more than 20 kg extra rice relative to those in Vientiane.

The results also confirm the shape of the curves depicted in Figures 9 to 11, i.e. that Lao people in the second income quintile have similar per capita rice consumption to those in the fifth (particularly similar for LECS 4 data). Also being an urban dweller seems to have a significantly negative effect on consumption relative to living in rural areas (a difference of around 10 kg of rice per capita).

TABLE 4
OLS regressions, per capita consumption of rice both glutinous and ordinary (nutrition module data) (kg/year)

	Per capita rice consumption (kg/person/year)	Per capita rice consumption (kg/person/year)	Per capita rice consumption (kg/person/year)
Model	OLS	OLS	OLS
Dataset	LECS 3 and 4 pooled	LECS 3	LECS 4
Observations	11 929	5 926	6 003
Month	-3.10**	-5.43***	-3.88**
Month2	0.53**	0.99***	0.66**
Month3	-0.03**	-0.05***	-0.03**
Dummies for income quintiles (default: quintile 1)			
Income quintile 2	5.54***	6.44***	4.58***
Income quintile 3	9.55***	12.11***	7.30***
Income quintile 4	9.93***	11.52***	8.81***
Income quintile 5	6.91***	9.67***	5.05***
Log prices of glutinous rice	-1.67**	-6.83***	-10.48***
Urban dweller	-11.25***	-10.62***	-11.59***
Dummies for regions (default: Vientiane)			
Northern region	40.05***	29.26***	45.55***
Central region	19.02***	10.38***	23.96***
Southern region	20.64***	11.52***	25.61***
Dummies for altitude (default: lowland)			
Midland	3.36***	8.91***	-1.83
Upland	-1.61*	2.29	-6.26***
Dummies for border districts (default: inland district)			
Thai border	-0.07	1.15	0.13
China/Myanmar	1.91	9.82***	-6.96***
Viet Nam	-3.90***	-5.42***	-1.61
Cambodia	-9.69***	-11.94***	-7.87***
Household size	-0.58	-2.28**	0.90
Household size squared	0.02	0.14**	-0.07
Constant	119.52***	170.12***	187.72***

Source: LECS 3 and 4 datasets, and the authors' calculations.

Notes: * Significant at 10% level, ** significant at 5% level and *** significant at 1% level. OLS = ordinary least squares.

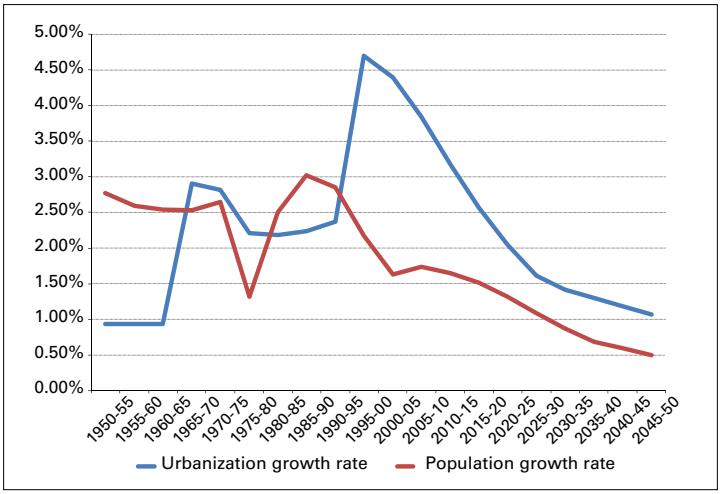
Demographics and economic growth

As indicated in the analysis above, the Lao PDR is no exception in the region as regards the relationships between rice per capita consumption, urbanization and incomes. On the one hand, as incomes and urbanization continue to increase in the Lao PDR, it is expected that average per capita rice consumption will decrease. On the other hand, population growth will still be generating additional demand for rice.

Regarding incomes, the Lao PDR is expected to continue with its present trend of high GDP growth driven mostly by the mining and the hydropower sectors. According to IMF projections (IMF, 2011), the Lao PDR's GDP is expected to grow by an average 8 percent annually during the Seventh NSEDP (2011–2015). Using data from UN Habitat's Global Urban Indicators database, FIGURE 13 shows urbanization and population average annual rates for five-year periods since 1950 and population estimates until 2050. While the estimates and data are slightly different from those of other sources (such as the World Bank and the National Bureau of Statistics [NBS]), they indicate the same trends: (i) the Lao PDR's population growth rate peaked in the late 1980s/early 1990s and the urbanization growth rate in the early 2000s; (ii) growth in population is slowing down significantly; and (iii) urbanization growth is expected to be stronger than overall population growth in the coming years. The final effect depends on the relative magnitude and speed of change of these parameters[11].

11 The simulation analysis in Chapter 5 shows that under the baseline assumptions of demographic and consumption changes, total rice consumption in the Lao PDR is expected to grow at a marginal annual rate of 0.5 percent over the 2012–2020 period.

FIGURE 13
Population and urbanization growth rates and projected growth rates (%), 1950–2050



Source: UN Habitat website www.unhabitat.org/stats/Default.aspx

In summary, our analysis suggests that the Lao PDR should be past or is close to a peak in average per capita rice consumption. This is due to the increasing urbanization trends and incomes. However, given population growth, total rice consumption is still expected to grow over the coming years, but at a slower rate as a result of declining per capita rice consumption.

Historical Rice Balances in the Lao PDR and Nutrition

National rice self-sufficiency and regional disparities

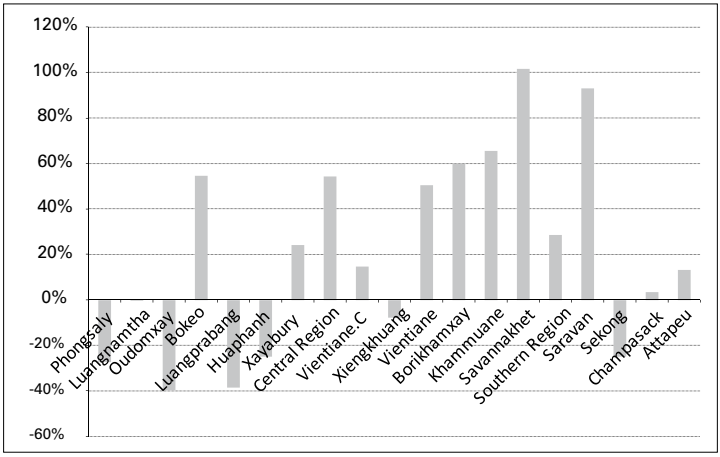
With expanding production, the Lao PDR achieved rice self-sufficiency at the national level. Given the uncertainties about rice use and associated technical parameters, it is not completely clear when this happened, but given patterns of rice production and consumption, we estimate that the turning point occurred during the late 1990s (see FIGURE 14). According to Batson (1991) quoted in Schiller *et al.* (2006), by 1948 the Lao PDR had already achieved some degree of national rice self-sufficiency despite pockets of poor rice availability. With the expansion of production and productivity, and the simultaneous reduction in population growth rate combined with the peaking of per capita rice consumption, rice self-sufficiency at the national level is now a stable reality in the Lao PDR.

FIGURE 14
Rice surplus since 1990 (tonnes of raw milled rice)

Source: MAF, NBS data and the authors' calculations.

At the regional level, however, there are major differences in terms of rice self-sufficiency, as indicated in Figure 15: population and rice production data for the different provinces in 2010 has been used to estimate the surplus of rice as a percentage of total consumption. Overall, the major rice deficit provinces are in the north of the country (Phongaly, Oudomxay, Luang Prabang and Huaphanh provinces) together with Sekong province in the south: they account for a total rice deficit of around 80 000 tonnes and also high levels of rice deficit relative to consumption (a deficit between 25 percent and 40 percent of consumption). To the contrary, the provinces of Savanakkhet, Khammuane and Vientiane (including Municipality) in the central region and Saravan province in the southern region account for most of the rice surplus: the total surplus amounts to around 335 000 tonnes or 83 percent of the total provincial surplus in the Lao PDR. In addition to inter-provincial disparities in rice self-sufficiency, there are also considerable intra-provincial differences in access to rice due to lower incomes, geographical characteristics (for example, mountainous areas) and limitations in transport infrastructure.

FIGURE 15
Rice surplus/deficit as percentage of consumption by province, 2010



Source: MAF, NBS data and the authors' calculations.

It is important to note that most of the rice deficit regions as presented in FIGURE 15 have the largest maize surpluses: the northern region, which has an estimated rice deficit of about 43 000 tonnes, has around 585 000 tonnes of combined maize surplus[12]. Moreover, some of the largest rice deficit provinces such as Oudomxay and Huaphanh are also some of the country's most significant maize producers, accounting for 15 percent and 11 percent, respectively, of total national maize production.

This may suggest that rice insecurity does not necessarily mean a staple or calorie deficit, as maize has roughly the same calorie content as rice. This is consistent with conclusions from WFP's Comprehensive Food Security and Vulnerability Analysis (WFP, 2007) of households' dietary patterns and ability to switch between staples. In fact, when taking into account calories from maize, only Phongsaly, Luang Prabang and Sekong provinces remain in deficit in terms of calories from staple crops. However, according to LECS data, the average household consumption of maize in the Lao PDR is still very low, which would indicate that most maize produced in the Lao PDR is being exported to neighbouring countries and revenues are used to purchase rice domestically. In addition, of the three calorie deficit provinces mentioned above, the two largest – Phongsaly and

12 The authors' estimates using 2010 NBS population data and MAF production data.

Luang Prabang – are the largest producers of cassava, which is being exported to Thailand for further processing into animal feed.

Because the northern provinces do not produce enough rice themselves, the shortfall to meet local consumption needs must come from either the central or the southern provinces or be imported from neighbouring countries, whichever is more cost effective. In fact, the estimated rice deficit of 43 000 tonnes in the northern region can be supplied by the single province of Vientiane, which has the lowest transport cost to these provinces (Vientiane Municipality is able to meet its own rice consumption requirements). This would suggest that the surpluses produced in the key rice-producing provinces of Khammouane, Savannaketh and Saravane could all be exported to neighbouring countries, given their geographical location which minimizes the transport and logistics costs of trade.

The above analysis shows that trade, both domestic and regional, may already play a more significant role in meeting localized rice consumption and access requirements in the Lao PDR than that often perceived by policy makers. Data from the Ministry of Industry and Commerce (MoIC) show that during the 2010/11 period, the Lao PDR officially imported 55 256 tonnes of rice, 25 837 tonnes of which were glutinous rice. This happened during a time when MAF estimates showed a country surplus of 411 210 tonnes of rice in milled equivalent[13]. It is not clear whether the rice was imported to meet the demand for higher-quality rice in Vientiane Municipality and other urban centres, or to supply rice to rice deficit areas in the north. Yet, it is not surprising that the Lao PDR imported rice, given that it is the smallest producer of rice in the region and exports less glutinous rice than either Viet Nam or Thailand.

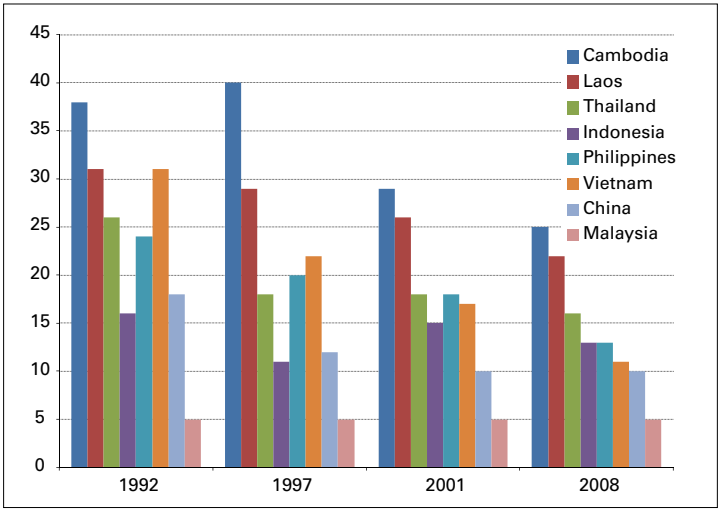
Nutrition and food security

The Lao PDR has made progress in reducing malnutrition. FIGURE 16 indicates the evolution in prevalence of undernourishment in the Lao PDR and other Asian countries. It shows that the prevalence of undernourishment in the Lao PDR registered 31 percent in 1992 and 22 percent in 2008. Still, 22 percent is a high figure and substantially above that of other countries in the region (for example, it is double the prevalence of malnutrition in Viet Nam). Moreover, given

13 One explanation is that significant quantities of paddy rice are being informally exported from the southern and the central provinces to Thailand, where milling and transport costs are lower than in the Lao PDR, and then re-exported back to Vientiane as milled rice.

population growth in the 1992–2008 period, the absolute number of undernourished people has actually slightly increased (7.7 percent in the 1992–2008 period).

FIGURE 16
Prevalence of undernourishment (% of population) in historical and regional perspectives



Source: World Bank DataBank.

While access to rice is an important part of food security, a recent analysis by Ramasawamy and Armstrong. (2012), using LECS 3 and 4 data, also shows that there are significant diet imbalances in the Lao PDR. The analysis indicates that carbohydrate consumption (driven by rice) has reached levels above WHO international standards (average 79 percent of DEC versus 75 percent reference), while protein consumption is on the low end of the acceptable range and fat intake is well below the recommended minimum (11 percent of DEC versus 15 percent recommended). This is largely explained by diets in rural areas, with Vientiane being the only province where the consumption of carbohydrates is within the recommended range.

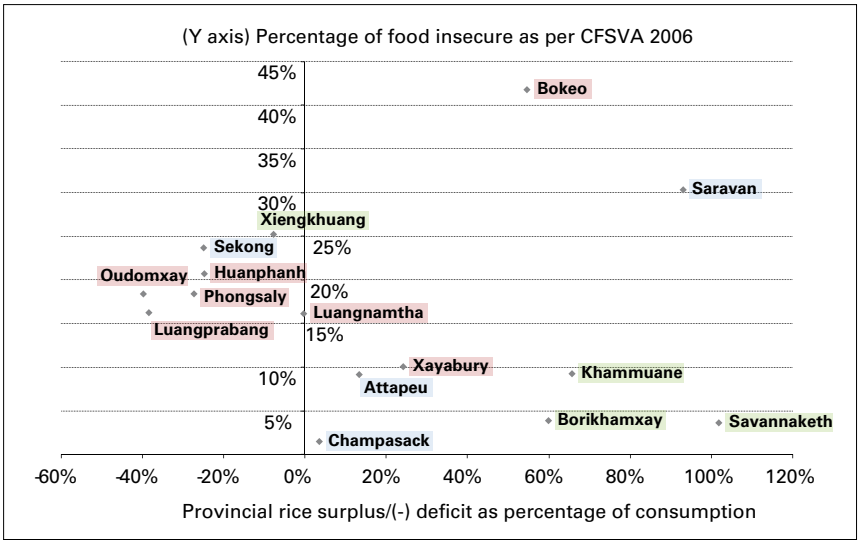
These findings are in line with findings from WFP's CFSVA 2007 on dietary diversity in the Lao PDR. WFP's analysis, using Food Consumption Scores applied to about 4 000 households, found that almost 13 percent of the surveyed sample had poor or borderline dietary diversity, mainly due to a lack of protein and fat consumption. WFP concludes that "addressing low consumption of staples (rice) and

securing overall caloric intake is less urgent than promoting a higher intake of animal protein, oil/fat and fruits. Given the high levels of chronic malnutrition in rural areas, this should go in pair with increasing the overall micro-nutrient intake" (WFP, 2007).

Finally, WFP's analysis also indicates that food insecurity in the Lao PDR is highly localized. Around 84 000 rural households have been identified as food insecure, based on the lack of dietary diversity, with 70 percent of these in only seven provinces. Addressing the food deficit needs of this group would require about 34 000 to 42 000 tonnes of rice distribution stocks[14]. Going a step further with the analysis, the overlap between estimated rice surpluses/deficits and the CFSVA food insecurity data is shown in Figure 17. An interesting observation is that two of the provinces showing the highest proportion of food insecure households (based on dietary diversity scores) also seem to perform quite well in terms of rice surplus as percentage of consumption (Bokeo province in the northern region and Saravan province in the southern region). Moreover, while it shows higher levels of food security in some of the important rice surplus provinces (such as Savannaketh), FIGURE 17 also shows provinces with similarly high food security levels and a much lower rice surplus as percentage of consumption (such as Champasack province). While findings reflected in FIGURE 17 are clearly not sufficient to establish any strong causal link, they still seem to point to some of the findings in the literature: rice surpluses do not necessarily translate into improved food security outcomes.

14 Assuming six persons per average household and 200 kg per capita consumption requirement for four to five months.

FIGURE 17
Analysis of rice surplus/deficit (% of consumption) and percentage of food insecure households by province, 2006 (from CFSVA)



Source: CFSVA 2006 data (WFP, 2007) and the authors' calculations on estimated provincial rice surplus/deficit.

3. The Rice Value Chain: Observations on Structure and Performance

Economics of Rice Production in the Lao PDR

Rice production in the Lao PDR is an essential part of the livelihoods of around 724 000 producers. As an illustration of the importance of rice, the second most popular crop, maize, is only produced by around 187 000 farmers.

While the total number of farm households in the Lao PDR has increased by 17 percent between 1998/99 and 2010/11, the share of farm households growing rice has actually decreased, possibly indicating a shift in production to other types of crops. From about 77 percent of all farm households growing rice in 1998/99, the share was down to around 71 percent in 2010/11, according to the latest census data (2012).

Farming systems in the Lao PDR can be broadly categorized into two types: the lowland rainfed and/or irrigated farming system, mainly in the central and southern regions; and the upland swidden farming system, predominantly in the northern mountainous region.

Subsistence rice cultivation is still dominant but an increasing number of subsistence farmers are marketing some rice, which suggests a rapid transformation of the rice sector from one of pure subsistence to one with a more commercial orientation. According to the latest census data, 71 percent of farm households in the Lao PDR sold some rice in 2010/11 versus 35 percent in 1998/99. In addition, the share of farmers producing rice mainly for sale has risen from only about 6 percent in 1998/99 to 30 percent in 2010/11.

Farmers generally practice small-scale farming but the average size of rice holdings has been increasing over the last 12 years. If one considers all agriculture land, farm households averaged 2.4 ha of landholdings in 2010/11 versus 1.6 ha in 1998/99. In the case of rice landholdings, these have also been increasing in size. From an average of 1.1 ha wet season area in 1998/99, rice landholdings increased to an average of 1.4 ha in 2010/11. In a similar way, dry season rice landholdings increased in the past 12 years from an average of 0.59 ha

to 0.65 ha. Glutinous rice accounts for around 92 percent of the rice grown in in the Lao PDR (2010–2011 Lao Agriculture Census data).

Current profitability of rice production

In order to understand profitability of rice production in the Lao PDR, three production system types were developed, based on data collected during field interviews conducted in January 2012. The data generated formed the basis of simulation models to analyse the impact of potential measures to overcome the current technical constraints on increasing rice production. The impact of simulated practice changes are subsequently measured using the gross margins and return to labour for each farmer type.[15]

The production models (TABLE 5) and associated simulations (Chapter 5) are based on information sourced from previous studies of rice production in the Lao PDR, including research conducted by NAFRI in collaboration with IRRI in the Lao PDR, a series produced by the Australian Centre for International Agricultural Research entitled Extending crop yield improvements in Lao PDR (Harris, 2011) and trial results published in the book entitled Rice in Laos (Schiller *et al.,* 2006). Following data collection and discussions with key informants including technical reviewers, the models were also discussed in detail with officials of the National Agriculture and Forestry Extension Service (NAFES) and the National Agriculture and Forestry Research Institute (NAFRI) to produce the final versions.

15 The partial crop budgets were cross referenced against similar budgets recently compiled by the Agricultural Centre for International Agricultural Research (ACIAR) and NAFRI. The data set collected for this study is within acceptable tolerances of accuracy compared with the ACIAR data.

TABLE 5
Summary description of current rice production systems by farmer typology

	Farmer typology		
	Type A	**Type B**	**Type C**
Production practice	Low input wet season rice (lowland)	Average input wet season rice (lowland)	Higher input wet season rice (lowland)
Hired labour[16]		x	x
Mechanization for field preparation	x	x	x
Fertilizer (in crop)	x	x	x
Pesticide			x
Modern seed varieties	x	x	x
NOT replacing R3 seed every three years	x	x	x
Contract threshing		x	x

Source: The authors' estimations.

The first production model is an example of a low input/quite low yield wet season rice (lowland) production system (Type A farmer). The system utilizes only family labour and a hand tractor for field operations, and threshing is done manually. Very little fertilizer is applied (around 50 kg/ha of NPK 16/20/0) and neither pesticide nor herbicide is used. Modern glutinous seed varieties are used; however, they are not renewed every three years. The paddy yield is 2.1 tonnes per ha and the average wet season paddy price (across all wet season models) is Kip 1 800/kg. The gross margin per ha is USD 267, with a return to labour of USD 2.40 per day. Assuming a typical farm size of 1.3 ha for the Type A farmer, the model suggests an annual gross margin of USD 347.

The second production model is an example of an average input/average yield wet season rice (lowland) production system (Type B farmer). The system utilizes some hired labour for field operations, such as transplanting and harvesting, and a hand tractor for field operations, and threshing is contracted and paid for. A moderate level of fertilizer inputs are used (150 kg/ha), however they are not applied

16 The hired labour rate is Kip 35 000 per day (USD 4.40/day).

in the optimal nutrient balance. No pesticides are used. Modern seed varieties are used; however, they are not renewed every three years. The rice yield is 3.0 tonne per ha. The gross margin per ha (including hired labour) is USD 245 with a return on labour of USD 3.80 per day. Assuming a typical farm size of 1.7 ha for the Type B production system, the model suggests an annual gross margin per ha (including hired labour) of USD 416.

The third production model is a wet season plus dry season, relatively high input rice (lowland) production system (Type C farmer). Both the wet and dry season production systems utilize hired labour, a hand tractor, a moderate to high level of fertilizer inputs, limited pesticides and modern R3 seed varieties (not renewed regularly), and source irrigation water via electric pumping from a river. The rice yield for the dry season is 4.0 tonne per ha with a paddy price of Kip 2 000/kg (i.e. around a 10 percent higher price than that in the wet season). The rice yield for the wet season is 3.5 tonne per ha. The annual gross margin per ha (including hired labour) is USD 489 for the wet season and USD 526 for the dry season with returns on labour per day of USD 6.00 and USD 4.80, respectively. Considering a typical farm size of 1.9 ha of wet season land and an irrigated cropping factor of 1.37 (37 percent of wet season land is irrigated in the dry season), the total annual gross margin per ha (including hired labour) is USD 866 and the return on labour is USD 5.60.

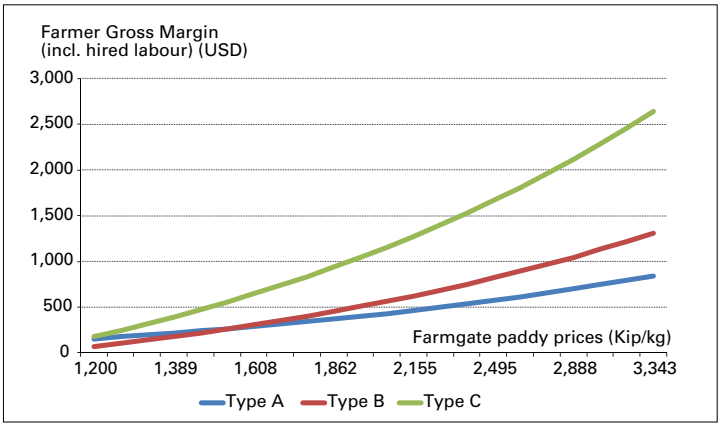
All gross margins are calculated at early 2012 price levels. The models showed significant differences in annual gross margins and returns on labour, as would be expected. From a policy perspective, it is interesting to note that for the Type A and Type B models, current returns on labour are below many of the currently reported wage levels for rural unskilled labour of between USD 3.00 and USD 5.50 per person per day[17] (the latter if the labourer is located near a major population centre or large corporate farming operation). It is difficult to have a complete picture on alternative options for unskilled labour in rural Lao PDR. However, based on field interviews in early 2012, increasing labour shortages are having a significant impact on the profitability and competitiveness of the rice sector. The increase in rural unskilled labour rates is also apparent from a comparison of current reported levels with those collected in the WFP survey five years ago (CSFV 2006). If one were to adjust the rural wage rates from 2006 to 2012 prices, the WFP survey would indicate a wage rate in the range

17 Based on discussions with MAF officials and provincial officials, and farmer and miller interviews.

of USD 2–USD 3.20 per person per day. Even at such levels (below wage levels currently paid), and indicative of wage rates increasing to above rates used in the consumer price index [CPI]), smallholder low input rice farming would not seem attractive in terms of returns on labour. This is a major issue for policy-making, as it affects the income of rice farmers and, thus, their incentive to grow rice, which if too low can result in a switch to cultivation of other crops or even a move to non-agricultural sectors.

Figures 18 and 19 show the results of a simulation conducted on different paddy farmgate prices (ceteris paribus) and their impact on gross margins and returns on labour. The maximum prices of paddy (rising above Kip 3 000 per kg) were found in 2010/11 and indicate overall high returns on labour, even for the Type A farmers/system (FIGURE 19), while at current prices (as low as Kip 1 200 per kg of paddy), even more commercially oriented farmers struggle to obtain satisfactory returns[18].

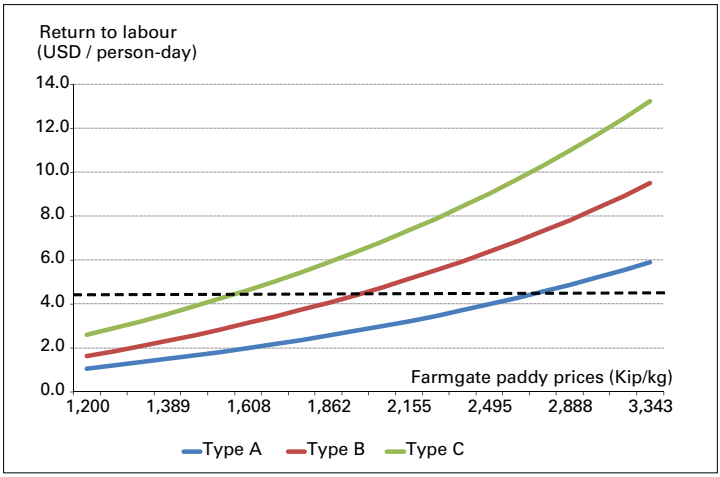
FIGURE 18
Simulation of gross margins for different paddy farmgate prices by farmer typology, early 2012



Source: The authors' calculations.

18 Estimation of the gross margins of alternative cash crops as a reference point to rice was beyond the scope of this study. However, a number of recent reports indicate a significant shift away from rice farming, which is accentuated by declining paddy price trends since the late 2010, in search of higher returns. For example, it has been reported that farmers in Luang Namtha have leased their paddy land to Chinese investors in bananas, who pay farmers Kip 72 million per ha per year. This is almost four times the gross margins of Type B paddy farmers.

FIGURE 19
Simulation of returns on labour for different paddy farmgate prices by farmer typology, early 2012



Source: The authors' calculations.
Note: The dotted line indicates average labour cost.

Brief overview of the constraints to production

While productivity gains have been achieved over the last two decades, there is still scope for significant improvement. A number of factors at play which explain continued low productivity include regional differences in soil and climatic characteristics, inappropriate production technologies, limited infrastructure (such as irrigation and drainage), traditional farming techniques and inappropriate input usage. As explained above, one of the increasingly important production constraints is the labour shortage. Some of the other known constraints are explored briefly below.

Fertilizer use

A key input constraint to increased productivity is the low and inappropriate use of fertilizers in rice cultivation. Despite the many demonstrated positive responses to fertilizer use on wet season and dry season rice production gross margins[19], it appears that the input cost of fertilizer is a major deference to many farmers. Studies indicate a positive impact of fertilizer use on gross margin if the price of paddy is greater than 2.5 times the price of fertilizer. Farmers who applied very low amounts of fertilizer usually confined the use of fertilizer to seedbeds

19 Rice response to inorganic fertilizer use is extensively covered by Haefele, Nivong, *et al.*, 2006.

or those parts of fields where rice did not grow well. Still, the key issue is that, while adequate fertilizer use would result in yield improvements, it would also result in higher investments for the farmers, which are not always optimal given farmers' risk perception of adopting this technology. According to the farm models, at present prices, fertilizer costs represent around 18 percent of non-labour costs per ha of wet season rice crop for Type A farmers, around 35 percent for Type B farmers and 54 percent for Type C farmers. For a Type A farmer with a total value of production per ha of around Kip 3.8 million (USD 473), increasing fertilizer use to the level used by a Type B farmer would translate into investing an additional Kip 0.6 million (USD 75) per ha, and to the level used by a Type C farmer would require investing an additional Kip 1 million (USD 125) per ha. Also a Type B farmer would need to invest around 20 percent of his/her average gross margin (after paying for hired labour) in the wet season to reach the level of fertilizer use of a Type C farmer. These are significant cash investments for farmers with high associated risks.

Access to water

Access to water has been identified as a major constraint affecting improvements to rice-based farming systems. These include farms within large-scale irrigation schemes and those drawing on smaller-scale, intra-village surface water and groundwater resources. In both settings, there are issues surrounding the institutional arrangements for infrastructure maintenance, water distribution, pumping costs, water charging and associated incentives, and the equitable sharing of costs and benefits given the scarce and variable water supply. There are also issues regarding incentives and support for the tapping of groundwater supplies for supplementary and dry season irrigation. Irrigation development and subsidization of operations and maintenance costs are key government policies with budgetary allocations made directly to rice producers (this is discussed further in Chapter 4).

Farm Credit

Accessing farm credit is a significant constraint to the use of more productive inputs (planting materials, fertilizers, pumps, tractors, driers). Government-supported agricultural banks endeavor to meet some of the shortfall in credit (see Chapter 4 for further details). However, as in many other countries, private farm credit is limited due to high transaction costs, insecure land tenure and uncertainty surrounding the returns on farm investments.

Improved agricultural techniques/practices

A further constraint to the adoption of improved practices in the Lao PDR is the general under-resourcing of extension services and heavy dependence on donor funding, which is tied to the project cycle. In the Lao PDR, there is a preferred extension model – the Lao Extension Approach – that has been developed with Swiss Cooperation assistance and adopted by the NAFES. However, resources for this system are limited and subsequent projects implemented by government and non-governmental agencies have not necessarily followed this approach. Moreover, while technical and training modalities have been defined, it is difficult to ensure sufficient incentives for extension staff to efficiently carry out their work at current funding levels.

Rice marketing

The marketing of surplus rice in the irrigated and rainfed lowlands of southern Lao PDR is a potential source of improved livelihoods for farmers and an incentive for the adoption of more intensive production practices (such as increased fertilizer use and mechanization). However, there are practical constraints surrounding post-harvest operations and rice quality, on-farm storage, the structure and performance of the milling sector, and the exploitation of niche markets that limit expansion of the sector. At a policy level, inconsistency in government policy concerning cross-border trade (in multiple directions between the Lao PDR, China, Viet Nam, and Thailand) also limits expansion of the rice sector. The issue of price incentives is considered key to further productivity improvements and this subject is explored further in Chapters 4 and 6.

Environment/natural disaster

Annual drought and flooding are still problems for rice cultivation throughout the central and southern regions, and are only slightly less serious in the northern region. Regular flooding of the Mekong River affects 10–30 percent of the rice area in the southern and central regions. Savannakhet province suffers most from early or late season drought almost every year. Late season drought alone can reduce grain yields by 30 percent. (Fukai, Sittisuang and Chanphengsay, 1998).

Adoption of improved seed

Adoption of improved rice varieties has been the single most important factor in achieving significant productivity increases since the 1990s. NAFRI, through its Rice Research Centre, the National Rice Research Programme, and a regional network of seed multiplication centres and

stations, has developed improved Lao rice varieties and promoted their use among smallholder farmers. The adoption rates of these varieties over the past decade have been quite high, particularly in the central and southern lowland production systems, reaching some 65–80 percent of farmers in wet season and 100 percent in dry season[20]. Many farmers have adopted these new varieties in response to market demand, while continuing in parallel to cultivate traditional indigenous varieties to meet personal and family taste preferences.

These trends in adoption rates are also confirmed by data from the Lao-IRRI Rice Research and Training Project impact study published in 2006 (Shrestha, Boupha and Khamphoukeo, 2006). The adoption rates of modern rice varieties over the last decade have been quite high, particularly in the central and southern lowland production systems, and this has underpinned productivity growth: modern varieties were adopted by 80 percent of the surveyed households and planted in 69 percent of the rice area (almost all of dry season rice area and 65 percent of the wet season rice area). Finally, the central region, accounting for the largest part of the rice area, has the highest adoption rate. According to the latest census data, the share of improved rice varieties in total varieties planted in the Lao PDR has risen from 29 percent of all varieties in 1998/99 to 45 percent in 2010/11.

In order to maintain and build on the benefits of high adoption rates of improved varieties, the purity or quality of the planting seed must be maintained over time. Commercial R3 seed[21] for many modern varieties is not widely used within the country and planting seed is being used well in excess of the recommended three to four seasons, after which the seed stock should be replenished. The lack of use and unavailability[22]

20 The adaptation rates in Vientiane capital, Khammouane province and Savannaketh province were 80 percent for wet season and 100 percent for dry season. The adoption rate in Vientiane province was 65 percent for wet season and 100 percent for dry season (PAFES, 2011, and Thasano Seed Center, 2012).

21 R3 seed is third generation or replication of pure planting seed often produced under certified larger-scale field conditions.

22 The recent survey of seed production in the Lao PDR, which was carried out by MAF, shows that the total national production of R3 seed in all provinces was about 6 700 mt during the 2010/11 dry season and the 2011 wet season. Provided that at least three-quarters of this seed met minimum quality standards, the total production of R3 seed may have reached about 5 000 mt, which is more than ten times the seed production level in the early 2000s. Such production could provide seed replacement for about 62 000 ha of lowland rice paddy land. If R3 planting seed was replenished by farmers on a rotation basis every three years, current level of R3 seed production would service potentially up to 200 000 ha, depending on the per ha seed use rate. According to 2010 Agriculture Census data, total wet and dry season rice production area in the Lao PDR was about 980 000 ha.

of quality R3 planting seed inputs remains a significant constraint to continually improved rice productivity. Despite the improvements in varieties, in many instances farmers still use mixed seed varieties, often as a risk management strategy to limit potential yield losses due to adverse weather events. Quite often, the variety selected is not necessarily suited for the intended location.

MAF is responsible for the production of rice seed in the Lao PDR[23]. The seed production system involves the production of breeder seed (BS), and R1 and R2 seed for multiplication by farmers as commercial (R3) seed, none of which is officially "certified". The dominant improved varieties of R1 and R2 produced by seed multiplication stations in the Lao PDR are TDK 8 and TDK 11, respectively, which were released over the last five years, followed by TDK 1 and PNG 3. It is expected that demand for these varieties will remain strong over the coming years.

It should be noted that the current low level of R3 production is related to low or unidentified demand for seed, which results from a lack of private seed distribution systems, rather than supply side constraints. Most R3 seed produced by seed multiplication stations is sold to farmers nearby the stations and to food security projects funded by donors, without going through private input distribution systems. Some R2 seed is sold to rice millers, who have engaged with local farmers in contract farming arrangements in order to source uniform quality paddy for their operations. There are commercially oriented farmers who understand the benefits of R3 seed but are not always able to find it due to inefficiencies in the seed distribution system. Other farmers buy informally imported improved rice varieties from Thailand.

The seed sector in the Lao PDR needs significant restructuring in order to improve its efficiency and the effectiveness of use of public funds, while addressing the demand side factors discussed above. Annex 5 presents a suggested roadmap for the development of the rice seed sector in the Lao PDR over three phases (2011–2015, 2016–2020, and

23 NAFRI has been designated as the lead agency for seed research and development and has overall responsibility for organizing the seed supply system. There are three research stations which fall under NAFRI: Naphok (Vientiane Municipality), Phone Ngam (Champassack province) and Luang Prabang (i.e. Northern Agriculture and Forestry Research Centre [NAFReC]). Three seed multiplication centres (SMCs) – Thasano (Savannaketh province), Saravane and Luang Namtha – are under the Provincial Agriculture and Forestry Offices (PAFOs) and are thus expected to primarily meet provincial seed production needs.

2020–), while Appendix B presents proposed institutional relationships for better coordination of rice seed supply and demand.

Trading and Milling

Key supply chain characteristics and rice logistics

The rice supply chain in the Lao PDR is composed of numerous actors at district, provincial and national level. These include mainly farmers, collectors, millers, retailers, exporters and importers. According to qualitative data collected in the key rice producing locations in the country and to discussions with central and provincial-level officials, most of the paddy is milled in small processing units located at the village and/or district level. Farmers pay a milling fee of roughly Kip 200 per kg of paddy and keep the bran or simply leave it as payment. In this first sub-chain, most of the rice is consumed locally at village or district level and to a great extent by the farmers themselves.

A second sub-chain consists in paddy being bought by collectors (or brought by farmers directly to the mills) and sold to millers located at district level, who then mill paddy and sell milled rice to retailers at the district level or to government contractors (for example, the military and the police), or export directly. A third sub-chain includes more agents, as millers and collectors at district level sell paddy on to millers and collectors at the provincial level, who in turn mill it and sell milled rice at the local level to retailers (in key provincial urban centres) and to government procurement, as well as to export markets in Thailand and Viet Nam. Finally, paddy is being exported, based on produce collected by traders and millers, to Viet Nam and Thailand. Because paddy exports are banned, these are mostly informal channels.

Overall, based on the total rice surplus in the country, it is estimated that informal exports of paddy may currently have reached at least 100 000 tonnes per year, which translates into a minimum of USD 25 to USD 30 million. By comparison, official exports of milled rice were only 2 204 tonnes in the 2010/11 season[24]. These figures suggest that rice exports may already equal coffee exports and are a significant labour-intensive export for the Lao PDR (given that most of the country's exports – from the mining and hydropower sectors – are capital intensive).

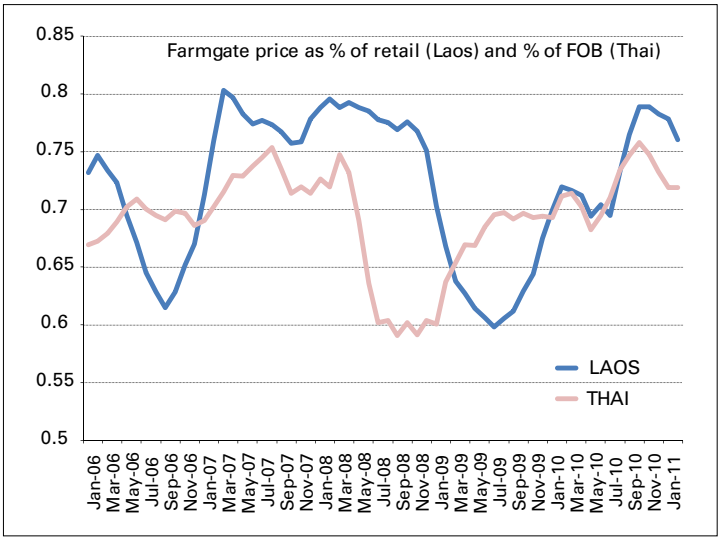
Domestic and international trading of rice are highly regulated. For example, all individuals involved in this trade in the Lao PDR need to

24 Source: Department of Import and Export, MoIC. Other sources put estimates of annual milled rice exports between 3 000 and 8 000 tonnes during this period.

be licensed and the licenses are specific to the purpose of the trade (for example, movement at district or provincial level). Whenever products are moved between districts or between provinces, a permit is required and must be obtained at the District Department of Industry and Commerce (DICO) or the Provincial Department of Industry and Commerce (PICO). In addition, exportation of rice is also highly regulated through a system involving the provincial and national governments (namely, the Domestic Trade Department of MoIC). The objective is to check whether rice balances are sufficient before any trade is allowed. The process also involves some bureaucracy, namely a first assessment by PICO and then a written request to MoIC for final clearance.

There is a general perception that farmers' margins are being hurt by declining paddy prices and that such low prices are, in part, attributable to excessive rents paid traders and millers. Casual observation of the number of actors in the rice chain and discussions about actors' margins do not seem to justify such claims. According to the qualitative data gathered, traders' margins are in the order of Kip 100 to Kip 200 per kg at a time when paddy prices are at Kip 1 800 per kg, i.e. profit margins are between 5 and 12 percent of sales value. Traders are also facing several obstacles in their day-to-day operations, including discretionary decisions on trade and poor road infrastructure in certain areas, both of which increase risks (and costs) of doing business. In addition, by just comparing farmgate prices with local retail prices in both Thailand and the Lao PDR, there is no evidence that the farmers' share of the final retail price in the Lao PDR is abnormally low (see FIGURE 20). The final section of this chapter will go into more detail on trade issues.

FIGURE 20
Farmgate price as a percentage of the retail price (Lao) and of the F.O.B price (Thai)



Source: MoIC and FAO price data, and the authors' calculations.

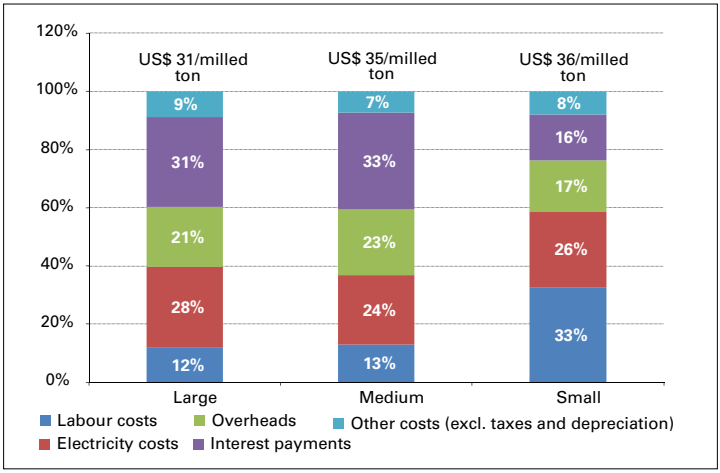
Observations on rice milling

Rice milling in the Lao PDR is mainly done at the village level and in small mills with poor equipment and an average capacity of around 6 paddy tonnes per day. While there are no consistent figures, such mills probably account for around 90 percent of the paddy milled in the country. There are probably less than 10 mills in the whole country that can be considered large and have an average processing capacity of around 33 paddy tonnes per day and 200 medium-sized mills whose average capacity is about 16 paddy tonnes per day.

Most mills operate at just about 50 percent capacity and with low operating profit margins, but the exceptions are those mills that are able to obtain government contracts with favorable terms and conditions or have access to credit at affordable rates. In addition to low capacity utilization, mills in the Lao PDR have poor milling rates (with few exceptions), mainly because processing equipment is old and technical capacity is lacking in many cases; milling rates are 58 percent and lower. More modern mills reach milling rates of 62 percent and higher. At present, most qualitative information gathered indicates an average milling rate in the Lao PDR of about 60 percent.

In terms of operating costs, large mills are most competitive, with costs at about USD 31 per milled tonne of rice compared with USD 35 for medium-sized mills and USD 36 for small mills (accounted before depreciation of assets and excluding the cost of the raw material). Also, there are some differences in operating costs between large/medium mills and the smaller ones (which have a higher share of labour costs) as can be seen in the cost breakdown in FIGURE 21.

FIGURE 21
Estimated breakdown (%) of operating costs (excluding depreciation) for the three main mill typologies



Source: Data collected from key stakeholders and the authors' calculations.

Regarding profitability, millers in the Lao PDR seem to be operating with narrow margins and are heavily dependent on their ability to achieve sufficient operating efficiency (milling rates and capacity utilization) as well as to obtain sufficient prices. Margins are not excessive: the value-added margin[25] stands between 12 and 18 percent, depending on the size of the milling operation and assuming a 50 percent utilization rate and a milling rate between 58 percent and 61 percent. Also, operating profit margins are not very high, as can be seen in TABLE 6. Most importantly, they do not seem very high considering the type of risks involved and their high sensitivity to capacity utilization and other variables. For example, a reduction in the

25 Value-added margin = [Sales – cost of goods sold] / sales.

milling rate of a small mill to 58 percent from 60 percent used in the model would yield zero net profit instead of a small profit[26].

TABLE 6
Estimated profitability and margins for the three main mill typologies

	Mill typology		
	Large	**Medium**	**Small**
Daily capacity (milled tonnes/day)	20.0	9.0	3.5
Annual sales (USD)	1 100 000	450 000	165 000
Operating profit (EBIT)	130 500	38 250	6 170
EBIT margin (%)	12	9	4
Net profit	94 000	23 700	4 500
Net profit margin (%)	9	5	3

EBIT = earnings before interest and taxes.
Source: Discussions with industry stakeholders and the authors' calculations.

There are certainly some exceptions that allow rents for millers, namely for those who are able to obtain subsidized loans and also to access government contracts for rice supply (which usually are quite favourable in terms of working capital requirements). However, overall the rice milling industry is operating at low efficiency and with low margins.

Role of Trade and Regional Trade Integration

If the Lao PDR is successful in consistently producing a paddy surplus, it will be important to manage that surplus properly and to obtain a good price for farmers. Obtaining a good price for farmers depends on becoming a reliable exporter, which influences the type of trade policy used. Trade policy (and buffer stocks) is also crucial for managing price volatility. In order to design trade and marketing policies that help to achieve these objectives in a cost-effective manner, it is crucial to understand how the Lao rice markets function and how they are connected to other markets in the region.

26 As an illustration, millers' profit margins in Cambodia ranged on average between 27 percent in 2006 and 9 percent in 2010. World Bank. 2010. Cambodia Rice Policy Note. (Unpublished).

The Lao PDR as part of a larger regional rice market (but not necessarily part of the world rice market)

Our analysis shows that the various rice markets in the region are surprisingly well connected, and this connection imposes constraints on the effective operation of trade policies. The Lao PDR borders on two significant country producers of glutinous rice. The glutinous rice production in Thailand is nearly double that in the Lao PDR. From 2005 to 2011, Thai glutinous production averaged 6.7 million tonnes of paddy compared with 2.9 million tonnes of paddy production in the Lao PDR in 2011 (assuming that 90 percent of total production is glutinous; FAO, 2009). Furthermore, Thai glutinous production is heavily concentrated in both space and time. Temporally, 86 percent of Thai production is harvested in November and December, the months of the main Lao harvest. Spatially, nearly all Thai production occurs in the north and northeast part of the country, regions which are adjacent to the Lao PDR.

In 2011, Viet Nam produced 3.67 million tonnes of glutinous rice on 767 800 ha (10 percent of the total national rice area). The average yield of glutinous rice in Viet Nam is about 4.8 tonnes of paddy/ha, which is significantly higher than the yield in the Lao PDR or Thailand. Viet Nam exports on average about 75 000 tonnes of glutinous rice per year, which is about 1 percent of its total rice exports.

As a part of this study, an analysis of the potential for the sale of Lao glutinous rice on Vietnamese markets was carried out. The survey showed that on average a rural household in Viet Nam consumes 65 kg of glutinous rice per year, while on average an urban household consumes 33 kg of glutinous rice per year. This is in addition to the substantial use of products made of glutinous rice such as glutinous rice cakes and desserts, which are consumed during Tet, glutinous rice wine, glutinous rice doughnuts, etc. The greatest use of glutinous rice occurs from December to February, when an average Vietnamese household consumes about 4–6 kg of glutinous rice per month, compared with May to September, when only 2 kg of glutinous rice is consumed by household per month. This consumption cycle overlaps with the demand for Lao glutinous rice by Vietnamese traders, with most informal imports of Lao glutinous paddy occurring from October to December.

The survey of Vietnamese consumers and traders showed that there is a preference for local varieties of glutinous rice (variety 352) over

glutinous rice imported from the Lao PDR. This may be due to the average lower quality of Lao milled rice, which can impact its taste properties. In addition, the high price of Lao glutinous rice on sale in Hanoi markets may indicate the need for additional polishing before sale in urban markets. In fact, exports to Viet Nam of Lao glutinous rice of improved varieties fetches a price similar to that of a traditional Vietnamese glutinous rice variety called Hoa Vang, which is considered superior due to its aromatic taste.

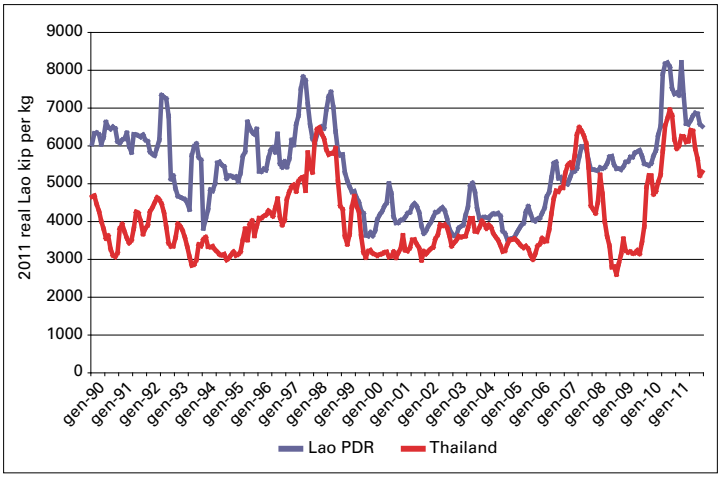
In general, the survey, albeit rather limited in its scope, showed that there is limited potential for exports of Lao rice to Viet Nam mainly due to quality issues. Lao paddy prices are typically cheaper than Vietnamese (and Thai) paddy prices at the farmgate level (about USD 0.25/kg in the Lao PDR compared with USD 0.55/kg in Viet Nam), while the Lao milled glutinous rice is generally of poor milling quality. Vietnamese traders surveyed in the study expressed their interest to import Lao glutinous paddy. By milling Lao paddy in Viet Nam, traders and millers are able to reduce its cost while ensuring the required milling quality.

Data on prices of glutinous rice and glutinous paddy in the Lao PDR and Thailand suggest that the Lao rice sector is part of a larger regional market. FIGURE 22 plots monthly data on the price of glutinous rice, adjusted for inflation, from 1990 to 2011. The data have been adjusted for inflation (i.e. they are in real terms), thus removing the effects of monetary policy that cause all prices to increase more or less consistently over the long term[27, 28].

27 Cumulative inflation in the Lao PDR since 1990 has been by more than a factor of 26, i.e. more than 2 500 percent.

28 Nominal prices have been deflated by the consumer price index (CPI). Ideally, nominal rice prices should be deflated by the non-rice CPI, but because rice is just 7 percent of the CPI, the difference is not likely to be substantial.

FIGURE 22
Price of glutinous rice (retail) in the Lao PDR and glutinous paddy (farmgate, converted to milled basis) in Thailand, 1990–2011



Source: FAO data and the authors' calculations.

Although the data for Lao PDR refer to the retail prices, and the data for Thailand refer to farm prices, visual inspection of the graph confirms that the two series are strongly related[29]. For example, from mid-1993 to mid-1998, prices rose steadily and substantially in both countries. Subsequently, however, prices declined sharply in both countries, but within about a year prices were back up to the levels of mid-1993. Prices then fluctuated around a constant trend for the next few years, until early 2006, when they began to increase sharply. By the second half of 2011, prices had reached record highs (adjusted for inflation) in both countries.

Rice prices between Thailand and the Lao PDR are likely linked by the activities of numerous traders who operate across the border and whose activities depend on the price differential between the two countries. If the price differential becomes too large, traders will act to reduce the differential to a more normal level.

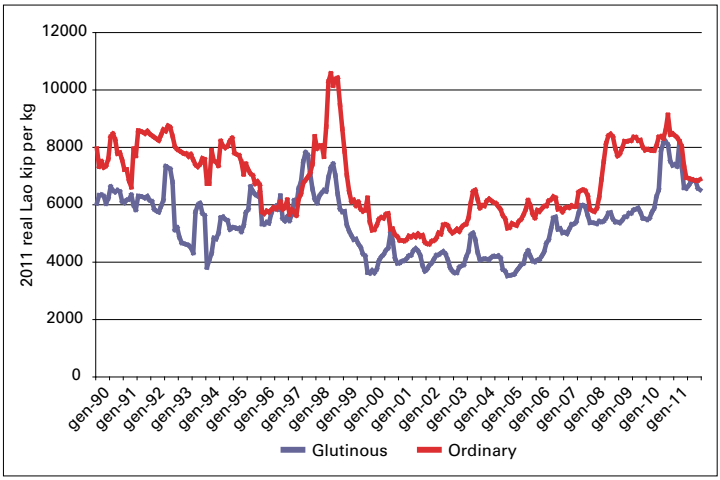
However, there are periods of time when prices in the two countries do not move together. For example, while Thai prices fell by 60 percent between July 2007 and November 2008, Lao prices were essentially

29 Formal econometric tests show that the price series are co-integrated, which means that any deviation from the normal relationship between the two variables is eventually eliminated. See Appendix 1 for more details.

flat during that time. But over the longer term the markets do tend to equilibrate.

Despite the price differences between the two types of rice, the markets for glutinous and ordinary rice in the Lao PDR are closely connected. FIGURE 23 graphs ordinary and glutinous rice prices in the Lao PDR during the last 22 years, again in inflation-adjusted terms. On average, over the entire period, ordinary rice prices were about 27 percent higher than glutinous rice prices at the retail level. Starting in the second half of 2010 and continuing into 2011, however, the premium on ordinary rice declined to just 7 percent on average.

FIGURE 23
Retail prices of ordinary and glutinous rice, 1990–2011



Source: FAO data and the authors' calculations.

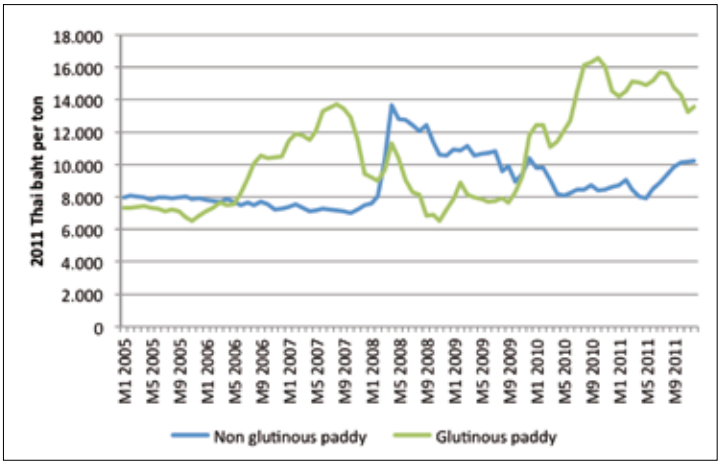
There are at least two possible mechanisms that could connect the prices of glutinous and ordinary rice. First, farmers can substitute between production of ordinary and glutinous rice, although such substitution cannot take place until a new crop is planted, which might take as long as a year. Second, consumers can make consumption substitutions, and these changes can take place very quickly. The relative importance of the two mechanisms is not known, but the fact that there is a connection is clear. However, there are periods of time when the prices of ordinary and glutinous become disconnected (but only temporarily).

While rice markets in the Lao PDR are linked to glutinous rice markets in Thailand, glutinous rice markets in Thailand are *not* closely linked to the larger Thai and world markets for white rice and jasmine rice. Farmgate prices for glutinous rice in Thailand move quite independently of prices of other types of rice, at least in the short run (FIGURE 24). Thus, for example, a large surge in glutinous paddy prices in 2006/07 in Thailand (and in the Lao PDR) occurred well before the surge in Thai non-glutinous paddy prices (and world market prices as well) in late 2007 and early 2008. The world market prices of both Thai glutinous and non-glutinous paddy peaked in April/May 2008 but the peak was much less pronounced for Thai glutinous paddy. Finally, the price surge for glutinous paddy in late 2010 did not occur for non-glutinous paddy.

In summary, rice markets in the Lao PDR are closely linked to a larger regional market for glutinous rice, but are not necessarily linked to the world rice market, which is primarily a market for non-glutinous indica rice (e.g. Thai 5 percent brokens). Such a linkage to a larger regional market places constraints on the ability of domestic trade policy and buffer stocks to influence domestic prices. At the same time, rice prices in the Lao PDR would not necessarily be caught in world rice market turbulence. This analysis is consistent with the findings of the recent World Bank study (World Bank, 2011a) which showed that regional trade was the likely main cause for high glutinous rice prices during the 2010–2011 period. The analysis in the World Bank study shows that regional trade patterns with Thailand and Viet Nam trigger price increases, which in turn may have been exaggerated by domestic price and trade policy responses. The study found that trade with Viet Nam is likely the main reason for short-term price fluctuations, while trade with Thailand affects medium- and long-term price trends[30].

30 World Bank. 2011. *Lao People's Democratic Republic: Responding to Rice Price Inflation.* Policy Brief. Report No. 62276-LA.

FIGURE 24
Glutinous and non-glutinous paddy prices (inflation-adjusted) in Thailand, 2005–2011



Source: FAO data and the authors' calculations.

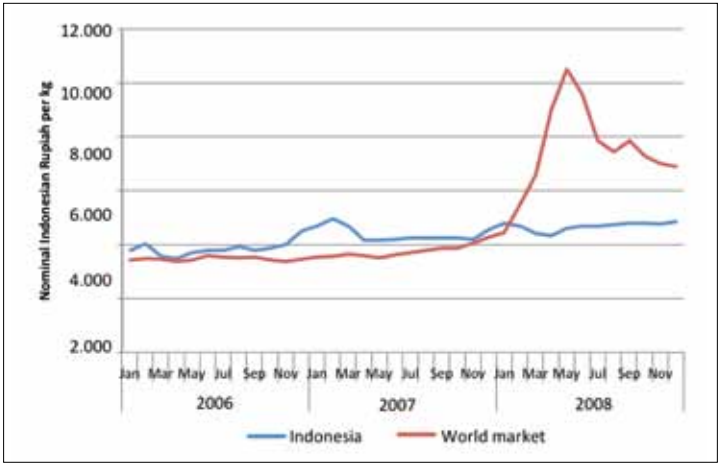
The effectiveness of buffer stocks in managing price volatility

An effective trade policy is a precondition for the effective use of buffer stocks. The key to managing price volatility is to use trade policies to influence the flow of trade between the Lao PDR and the neighbouring countries. If the border is completely open, and markets function reasonably well, then rice prices in the Lao PDR will fluctuate in line with those of its neighbours. Indeed, if markets functioned perfectly, buffer stocks would not be of any help. For example, if domestic prices are judged to be too low, and the government tries to support prices by buying paddy, then paddy may flow in from Thailand in order to take advantage of the higher price. Conversely, if domestic prices are judged to be too high, and stocks are released to try and lower retail prices, then traders will start to sell the extra rice to Thailand because of higher prices there. In turn, this flow out of the country will raise prices in the Lao PDR, thereby defeating the purpose of the original injection of supplies.

The importance of managing the border trade vis-à-vis buffer stocks is reflected in the behaviour of the three large countries that were able to insulate their domestic rice prices from the large surge in world market prices: China, India and Indonesia (see FIGURE 25 for Indonesia). During the 2008 world food crisis, each of these countries closed their borders to international trade and actually added to stocks, as opposed

to distributing stocks to dampen market price increases. In other words, because buffer stock levels increased on balance during 2008 in these countries, it was clearly not buffer stock releases that were responsible for keeping domestic prices below world prices.

FIGURE 25
Rice prices in Indonesia and the world market



Source: Saifullah, 2010.

Buffer stocks play a limited role

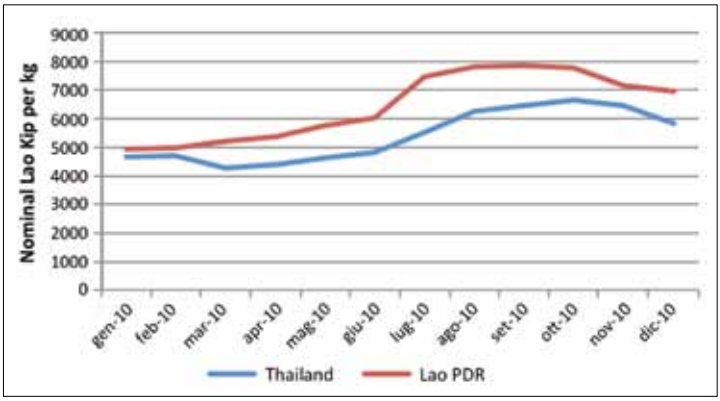
While trade policies are the most important consideration for managing price volatility, it is possible that buffer stocks may have a short-run impact on market rice prices due to quality considerations. For example, if buffer stocks of low quality are released by the government, it may be difficult to find a market for these supplies in Thailand, and, thus, rice prices could be reduced temporarily in the Lao PDR. It is important not to overestimate this possibility, however. There are always poor consumers in Thailand who would switch to lower quality rice when rice prices are high, so the possibility of buffer stock releases flowing over the border is strong.

During interviews for this study, some people expressed the view that buffer stock releases were successful in bringing down rice prices in Vientiane province in the second half of 2010, but it is difficult to verify such an assertion. FIGURE 26 shows nominal glutinous rice prices in the Lao PDR and Thailand, but only for 2010. The patterns of price movements in the two countries are very similar, and it is hard to imagine that stock releases in Vientiane province drove prices down in

Thailand. It seems more likely that some broader market development drove prices down in both locations. Furthermore, price declines in Khammouane and Savannakhet provinces occurred roughly in parallel with price declines in Vientiane province, even though stocks were released only in Vientiane province (see Figure 27). Indeed, for 2nd quality glutinous rice, prices in Khammouane province started their decline one month before prices in Vientiane began to decline.

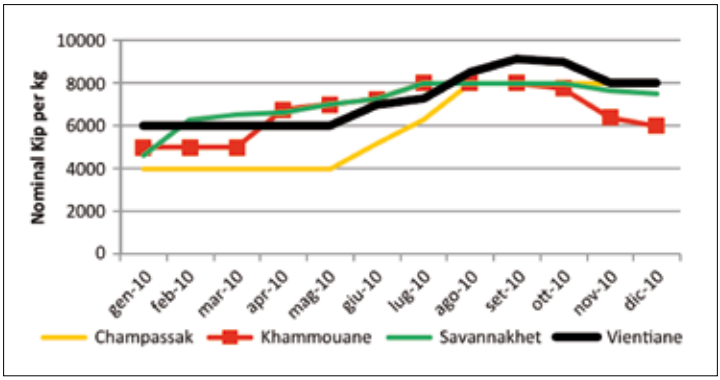
In summary, buffer stocks will be effective for only a short period of time at best, given the Lao PDR's integration with larger regional markets. Further, their effectiveness is contingent upon closure of the border/trade restrictions (see below for a discussion of options in this regard). Thus, a large expansion of buffer stock beyond the current level would not be an efficient use of government financial resources, given the integration with regional markets. In addition, while in theory using buffer stocks to manage price volatility shows promise, such an intervention must be designed carefully to minimize distortions and be cost efficient. Market distortions can arise mainly from the millers' selection process and the fact that subsidized credit is being provided.

FIGURE 26
Nominal glutinous rice prices in the Lao PDR (retail 1st quality) and Thailand (paddy, converted to milled basis), 2010



Source: FAO data and the authors' calculations.

FIGURE 27
Nominal glutinous rice prices (retail 1st quality) in several provinces, 2010–2011



Source: FAO data and the authors' calculations.

Export bans function poorly as a tool to maintain price stability

Rice trade policies are widely used in Asia – free trade is rare, if it exists at all. Trade restrictions set in place by these policies can, under some circumstances, help to control price volatility, but also have costs. One of the key costs of these trade restrictions is that they often create risks for traders. These added risks make it more difficult for traders to stay in business, which means that marketing margins grow wider. In turn, wider margins mean lower prices for producers and higher prices for consumers[31].

In order to avoid unnecessary risks, it is important that trade restrictions be predictable and allow the private sector some flexibility. An export ban does not meet these conditions, as a ban is typically applied with little if any advance notice, and a ban, furthermore, does not permit any trade. Given the long and porous borders between the Lao PDR and the neighbouring countries, there will in reality always be some informal trade in rice and paddy. However, it is important not to underestimate the impact of export bans. While export bans do not fully eliminate informal trade, they do have enough power to reduce it to a reasonably large extent, as traders do not want to get caught, make informal payments to authorities to avoid being caught, or develop new trade routes. All

31 There are other costs of rice trade policies in the Asian context, although these do not apply to all countries. One other cost is that they often increase poverty and retard the development of labor-intensive manufacturing by raising the price of the main staple food. Another cost is that, if the restrictions are strong and in place for a considerable period of time, they create large efficiency losses in the economy.

these factors raise the cost of rice exports, making it difficult for the private sector to carry out trade efficiently.

Efficiency in trade will be important if the Lao PDR aims to establish a reputation as a credible exporter given its recurring rice surplus. In fact, export bans for rice and paddy have not been effective in reducing rice price volatility, as experienced in recent years, due to additional uncertainty of their impact on rice markets, and the lack of accurate information on production volumes, consumption, stocks and trade flows. Furthermore, international experience shows that trade restrictions and price controls might have inadvertently exasperated price volatility, rather than limited it, as evidenced by 2008/09 food price volatility. This is because the use of discretionary trade policies actively discourages production and trade. Countries that have not used discretionary trade and price policies have seen steady production growth. For example, Cambodia, which has not used trade restrictions since 2000, has seen its paddy production increase at an annual rate of 6 percent between 2001 and 2011.

4. Government Policies and the Rice Sector

In the Lao PDR, there is no comprehensive rice policy that cuts across different government institutions, but rather numerous policies stemming from different government sectors that affect the rice sector through a mix of regulations, and recurrent and investment programmes. The resulting policy mix plays a crucial role in determining the incentive structure of the different rice value chain agents (from producers to millers and exporters). It is, therefore, important to understand (i) what the effects of such policies are on the welfare and decisions taken by agents in the rice value chain and (ii) whether the agents' decisions are compatible with achieving the targets and policy objectives of the Government of the Lao PDR. Understanding how the policy mix impacts rice value chain agents requires the mapping of policy objectives and key beneficiaries with the policy instruments used, and understanding the actual support to the rice sector.

Traditionally, rice-related policies are directly the responsibility of: (i) MAF for all support and regulations that affect producers or on-farm issues (including mainly research and extension, and irrigation development); and (ii) MoIC for trade policies and the rice reserve programme or, more simply put, all post-farm sections of the rice supply chain. Other ministries such as the Ministry of Finance (MoF) and the Ministry of Planning and Investment (MPI) also indirectly have an important role in the country's overall macro-economic balance and budgetary decisions (both for central and decentralized levels). The Ministry of Labour and Social Welfare (MLSW) is responsible for issues regarding social programmes that target very poor communities (also in relation to the national rice reserve) and for labour market issues in general.

This section starts by analysing the existing strategy, key policy objectives and programmatic targets of the Government of the Lao PDR that relate to or specifically focus on the rice sector. It then focuses more directly on a detailed analysis of key relevant policies that impact rice value chain agents, including direct budget transfers (mainly through extension, irrigation investments and subsidized credit), trade policy and taxation. Finally, this section presents the results of rice producer support estimates (PSEs) for the Lao rice

sector from 2006 to 2011. The methodology of the Organization of Economic Cooperation and Development (OECD) is used for calculating PSE[32]. The PSEs give a first indication of the level and type of support for the rice sector and complement some of the analysis presented in Chapter 3.

Strategic Context and Key Policy Objectives

A brief overview of key reference documents

There are three main key policy reference documents that outline the objectives and the strategic framework for the rice sector in the Lao PDR: (i) the Political Report of the 8th Party Central Committee to the 9th Party Congress in 2011; (ii) the 7th National Socio-Economic Development Plan (NSEDP); and (iii) the Agricultural Development Strategy (ADS) and associated Agricultural Master Plan (AMP).

The Political Report to the 9th Party Congress focuses on reducing individual poverty through promotion of commercial production and rural development. The report recognizes the importance of agriculture and forestry as "a fundamental sector or our national economic structure" and calls for a fundamental transformation of the rice industry in the Lao PDR; to modernize the sector, making it both more productive and market-oriented. The report has been the subject of directives from the Prime Minister's Office and is the key political document underlying the preparation of a national rice policy.

In terms of policy objectives for agriculture, the report mentions mainly food security, development of rural areas, poverty reduction and economic growth. It sets the overall goal of advancing the Lao PDR from low income status by 2020 and states very concrete targets for 2015, including annual economic growth at 8 percent for the period 2011–2015 and a reduction in the number of poor families to 10 percent of the population (as does NSEDP below). It is expected that targets will be achieved through a number of initiatives such as "removing administrative and managerial orders and methods that block production, business and services" and "improving the business climate, enabling greater synergy and competitiveness within the national economic base". Specifically, with regard to agriculture, the report mentions several priorities including "speeding up allocation of land nationwide, development of irrigation and sustainable water use and modernization of production and processing".

32 See Annex 2 to this document for a brief description of PSE and also key methodological issues in calculating rice PSE for the Lao PDR.

The report also acknowledges at a broader level some of the policy gaps and difficulties that create obstacles to growth. In particular, it highlights the lack of clear policies, including tax, credit and marketing policies to support commercial production. In addition, it states as a short-term objective to "abolish policies, mechanisms, legislation and procedures that are no longer in keeping with the state mechanism for a market oriented economy,…, as well as abolishing bureaucratic administration and loopholes that enable officials to be corrupt and seek opportunities for personal gain".

The 7th NSEDP for the period 2011–2015 seeks to achieve sustainable economic growth and reduce poverty (and inequality). It targets annual economic growth of at least 8 percent for the 2011–2015 period. It is expected that key sources of growth will come from diversifying and deepening economic activity, developing human capital and improving labour productivity. The plan underscores the importance of maintaining political stability and peace while developing an open economy that is integrated into both the regional (ASEAN community) and world economies. This is an important point, as maintaining stable and low staple food prices is an important pillar of political stability in the Lao PDR. However, increasing trade openness and regional market integration is expected to increase linkages of Lao food prices to international price movements and their respective volatility.

The ADS, 2011–2020, has as its primary goal to achieve food security by 2015 in order to meet the necessary calorie intake requirements, especially in remote rice deficit areas. Its longer-term goal for 2020 includes the development of modern, lowland, commercially-oriented agricultural production systems, while conserving upland ecosystems. It is expected that lowland farmers will produce a surplus of rice and other commodities for sale to domestic markets and regional export markets. The emerging government vision is of a concentration of modern farming activities in the large plain areas along the Mekong River and in the smaller plains in upland areas, and the development of domestic markets to facilitate intra-provincial trade of agricultural products. The ADS also envisions that smallholder producers will play a greater role in processing, labeling, branding and promoting agriculture products, notably through farmers' organizations, in partnership with the private sector. While the strategy envisions production of specialized high-value crops for local value-added agroprocessors and (niche) export markets, it does not provide much detail about how the agribusiness industry is expected to access export markets and what

policy changes are needed to promote trade facilitation. It is worth noting that the ADS seems to implicitly separate the objectives of food security (until 2015) and commercialization of agriculture (from 2015 to 2020). While the distinction can be useful, the fact that such objectives and the related policy instruments have important implications for each other may be overlooked. The implications are discussed in the next sections of this chapter.

The AMP provides a roadmap for the implementation of the ADS. It proposes measures and interventions that various agencies need to undertake at the national, provincial and district levels in order to achieve the 2015 goals of the ADS. The related Agricultural Investment Plan (AIP) provides a framework of financial needs associated with the AMP. As such, the AIP is the main vehicle for transforming the strategy into action within the Government of the Lao PDR but primarily among development partners.

The ADS does not focus on the nutritional dimension of food security. Such issues are dealt with through the National Nutrition Policy (NNP, 2006) and the National Nutrition Strategy (NNS, 2009), along with the accompanying National Plan of Action (NPAC). The focus of the NNP, together with the NNS and NPAC, is to substantially reduce levels of malnutrition, especially among vulnerable groups. These strategy documents have been instrumental in mainstreaming the nutrition dimensions of food security in the 7th NSEDP. However, neither the NNS nor the NPAN address the linkages between food security and nutrition. The NNS is a health-focused strategy, which would need to be complemented with policies which are tailored to the food availability and accessibility aspects of food security.

Rice sector targets by 2015

On the basis of the above documents and especially the Political Report to the 9th Party Central Committee and the 7th NSEDP, MAF has developed the following targets for the rice sector in 2015:

- Total paddy rice production increased to 4.2 million mt from 3.7 mt in 2010.
- Average yield of paddy increased:
  - from 3.7 mt/ha in 2010 to around 4.5 mt/ha in the lowland rainfed regimes, and
  - from 4.7 mt/ha in 2010 to around 5.5 mt/ha in the dry season regimes.

- 170 000 ha in the plains areas would be opened up and/or provided with facilities for intensification of rice production.
- 600 000 mt of high-quality, non-glutinous rice would be exported, mostly to countries in the ASEAN region but also to the international market.

Food insecurity (inability to meet minimum calorie requirements) and malnutrition (incidence of stunting and low birth weight) would be reduced by one-half through increased availability, access to and utilization of rice and other foods.

Disentangling multiple policy objectives

The above policy documents, and associated targets, lay out multiple overarching policy objectives that have significant implications for the development of the rice sector. First, they consist of a set of social and political objectives that relate to national and household food security and social stability. This set includes clear objectives such as food (rice) price stability, improved nutrition levels and reduced vulnerabilities in food (rice) deficit areas, while improving resilience to natural disasters. Second, they account for economic and commercial objectives which relate to farmers' economic welfare, supply chain efficiency, trade development and regional market integration, domestic market development and international competitiveness.

Of the above mentioned objectives, achieving national food security and (rice) price stability are probably the most prominent elements for maintaining political stability in the country. Yet, they seem to have contrasting implications for the incentives of rice-producing rural households. For example, achieving rice price stability at a low price level for food security purposes can be a desirable policy objective for maintaining political stability, but achieving stability may come at the cost of reduced farmers' incomes. This is because maintaining stable and low rice prices has implications for the incentive structure encountered by value chain agents and, consequently, can affect private sector investment in the rice sector (for example, leading farmers to shift to other crops or simply abandon agriculture in search of higher paying non-farm jobs). In a similar way, the objective of increasing exports (and related integration with regional markets) may "conflict" with those food security policy objectives that seek to maintain stable (low) food prices for a growing urban population. Such an argument can also be constructed regarding the objective of achieving rice self-sufficiency at provincial and district levels and the possible consequences for farmers, or regarding

the relationship between the objectives of rice self-sufficiency and improved nutritional outcomes. Focusing on rice self-sufficiency does not necessarily imply improved nutrition, in particular, if (i) farmers cannot earn a sufficient income with rice to be able to diversify their diets and/or (ii) there is not enough emphasis on education and health issues in order to support improved diets.

It is important to note that the *achievement of different policy targets will critically depend on the policy instruments used to achieve the desired objectives. Choosing the right mix of policy instruments is, therefore, fundamental if multiple (sometimes potentially conflicting) policy objectives are to be reached.*

To understand the implications of the different policy objectives for the various groups of Lao society, it is useful to distinguish between net producers and consumers of rice as these groups have opposite welfare situations: net producers benefit with an increase in rice prices while net consumers lose.

The current population structure of the Lao PDR puts it in a unique position whereby an increase in rice prices would have an overall positive effect on household welfare in the country[33]. The analysis of LECS 4 data suggests that a uniform 10 percent increase in rice prices raised average household welfare by 3.3 percent. While most of country's 723 500 rice-growing households, which are net producers, would gain from a rice price increase, urban households and some rural household in rice deficit areas (net consumers) would lose. Actual welfare effects vary by location. In provinces where households produce rice surpluses, these households generally gain from price increases. They make up about two-thirds of the total Lao population. Urban households suffer slightly, depending on the share of rice expenditure to total household expenditure, while remote rural households, which are net consumers located mostly in the northern provinces, will be negatively affected. Net producers in the Lao PDR will typically be rice farmers with enough land to produce for their subsistence and still have a surplus to trade. Even using conservative rice use assumptions, a family in the Lao PDR with six household members and practicing low input wet season rice farming would be

33 World Bank. 2011. *Lao People's Democratic Republic: Responding to Rice Price Inflation.* Policy Brief. Report No. 62276-LA. Also, Davis, C. and Baulch, B. 2011. Analyzing the Distributional Effects of Food Price Changes. Presentation, March 2011. Vientiane: Prosperity Initiative. Processed.

a net producer if it owns at least 1 ha of rice land[34]. In comparison, average wet season paddy area per household was 1.4 ha in the Lao PDR in 2010/11. Naturally, with irrigation (dry season farming), a family would need much less land. Census data from 2010/11 also suggests that in the Lao PDR, around 71 percent of farm households, most of which are also rice producers, sold some produce. This is a significant increase from 1998/99, when just 35 percent of farm households sold some produce, and shows the important ongoing transformation in Lao agriculture. Such data suggests that by conservative estimates, some two-fifths of the Lao population could be net producers who benefit from higher rice prices.

As mentioned above, a majority of the net consumers of rice in the Lao PDR are households located in urban areas, which are not involved in rice production, and also rural low income, rice deficit households. Although urban households still comprise a minority of the population, they are probably important from a political and social stability point of view. Policies promoting stable prices may appear optimal from a political and social stability point of view but whether they really are depends on urban households' income levels, which leads to a second important distinction: the need to differentiate the net consumers of rice according to their level of income.

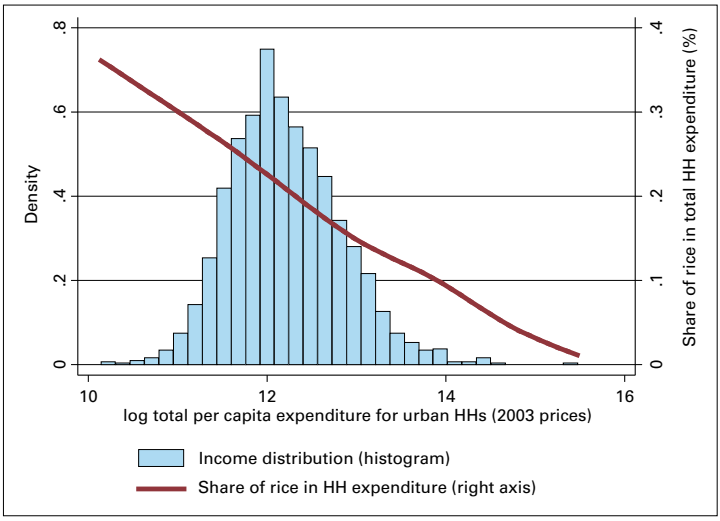
Analysis of LECS 4 data (2007/08) indicates that around 75 percent of urban households in the Lao PDR dedicate less than 30 percent of their total expenditure in Kip to rice and that about half allocate less than 19 percent. In addition, with increasing per capita incomes, the trend is towards a lower share of total urban household expenditure on rice. This is illustrated in FIGURE 28, which overlaps two graphs: (a) the distribution of income for urban households in the Lao PDR in 2007/08 according to LECS 4 data (histogram) and (b) the non-parametric estimation of share of total household expenditure for rice. The figure suggests a negative relationship between household wealth and share of expenditure on rice, which fits well with the consumption trends analysis in Chapter 2. Assuming that the remaining 25 percent of urban households, or around 535 000 people, are most vulnerable to rice price increases, a small food reserve of about 30 000 tonnes of rice would sustain such a population through the worst of rice price hikes[35].

34 This is based on very conservative rice use and a low input paddy yield per ha of 2 100 kg, and applying a 60 percent milling rate.

35 Assuming 125 kg per capita consumption over a six- to seven-month period.

In the context of the Lao PDR, and looking ahead, such an analysis has important policy implications: strong growth in the non-agricultural sectors and rising incomes in urban areas would result in rice accounting for an increasingly smaller share of total household expenditure. This in turn means that keeping stable but very low prices of rice may not be optimal as it provides few incentives for producers to invest more labour and capital in the sector. As discussed in Chapter 3, this also has implications for the ability to sustain the number of rice producers in the Lao PDR. Moreover, policies focusing on a safety net for the urban poor, which is based on a small food reserve, could be an interesting alternative.

FIGURE 28
Share of rice expenditure to total expenditure of urban households by income level, 2007/08



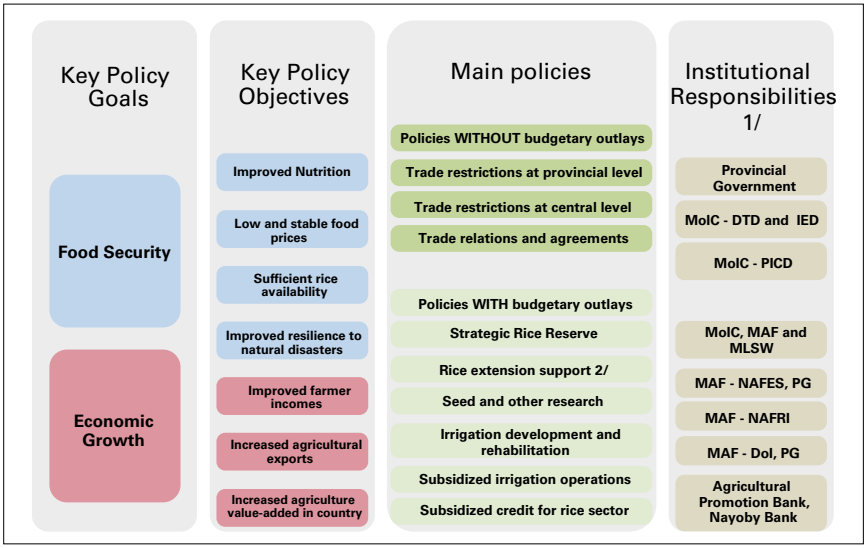
Source: LECS 4 data and the authors' calculations.

Rice Sector Support Policies

To achieve the policy objectives, there are a number of policies in place in Lao PDR. As discussed above, these policies use different instruments and do not form one consistent rice policy but rather a number of policies and this has intricate implications for the rice sector. Moreover, the way policy instruments are related to institutional responsibilities is not straightforward as there is not an obvious coordination mechanism. We attempt to summarize the relationship between goals, objectives, policies and responsibilities in FIGURE 29.

The figure is not intended to be comprehensive but is thought to include most of the relevant policies affecting the rice sector and the overall institutional responsibilities for them. In particular, it makes a distinction between current policies in the Lao PDR that do not require budgetary outlays and those that involve government direct expenditure (which translate into transfers from taxpayers to consumers, producers or other value chain agents).

FIGURE 29
A map of the policy goals, objectives, instruments and responsibilities in the Lao PDR



Source: Authors' estimates based on review of policy documents and interviews with public officials.
Notes: 1. MoIC – Ministry of Industry and Commerce; DTD – Domestic Trade Department; IED – Import-Export Department; PICD – Planning and International Cooperation Department; MLSW – Ministry of Labour and Social Welfare; PG – Provincial Government. 2. Strategic Rice Reserve has three components with different institutional responsibilities: (i) rice reserve (including subsidized credit to millers in exchange for keeping minimum stocks) under MoIC DTD; (ii) seed reserves under MAF responsibility; and (iii) rice distribution as part of the safety net under MLSW.

The group of policies that do not require budget transfers are mainly trade-related, namely through export bans. To some extent the policies

in this group also include tax concessions, as agriculture is not subject to the same level of direct taxes as other sectors of the economy. Farmers in the Lao PDR are taxed through a land tax, with agricultural land (and in particular rice land) taxed at a lower rate compared with other categories of land. However, due to the difficulties in estimating theoretical land values in order to compare rice land value with other land values, the analysis below does not focus on tax concessions. Moreover, tax does not represent a very high percentage of rice farmers' gross margins. For example, lowland rice in Vientiane province would be taxed normally at around Kip 45 000 per ha, which translates to an estimated range of 1 to 3 percent of a farmer's gross margin (including hired labour), depending on the typology of the farmer[36].

The policies that require budget allocations can be classified into:

(a). those directly benefiting individual farmers, including: (i) payments based on variable input use (seed, irrigation operations subsidies – mainly electricity and subsidized credit); (ii) fixed capital formation (irrigation development); and (iii) on-farm services (extension); and

(b). those benefiting agricultural producers collectively (such as research in rice seed, rice nutrient management, etc)[37].

Trade policy measures and national rice reserves

Overall, trade policy measures in the Lao PDR are mainly focused on managing price volatility for urban consumers in conjunction with a programme to establish a national rice reserve, which was started in 2009.

The trade policy measures impacting the rice sector include:

- *Trade bans at the provincial level*. Such bans are under the direct responsibility of provincial governors (PGs) and their discretionary power. First, bans can focus on rice or result in a complete border closure. Second, they can be simply export bans or, alternatively, affect both exports and imports. Finally, bans can impact not only international trade but also inter-provincial trade and. Normally, PGs, who have a mandate to ensure political stability through local rice availability and to keep prices under control, enforce export bans.

36 Calculations are based on the three main typologies of farmers developed in Chapter 3.

37 The presented breakdown of policies follows the OECD standard methodology for the calculation of PSE. See Annex 2 for more details on the methodology and classification of expenditures.

However, export bans may also result due to border problems or other circumstances not necessarily related to the price of rice (while actually having significant implications for the rice sector).

- *Trade bans at the central level.* These are under the responsibility of MoIC's Domestic Trade Department (DTD) and Import-Export Department (IED) and aim essentially at maintaining domestic price stability and, in particular, ensuring low rice prices. In addition, paddy export bans also aim at encouraging the development of the local milling industry.
- *Bilateral trade agreements and regional trade relations*. The trade relations between the Lao PDR and neighbouring countries, including formal trade agreements, impact the ability to exchange rice over the border. Trade agreements and relations are normally the responsibility of MoIC but, given their complexity, are also generally an issue for the country's foreign relations. Trade agreements also include export quotas for milled rice for Viet Nam[38].

The Lao rice reserve policy includes three components, namely: (i) the National Rice Reserve (NRR) under the responsibility of MoIC's DTD; (ii) seed reserves, which is the responsibility of MAF; and (iii) emergency rice distribution programmes under MLSW.

The NRR started in 2009 with a pilot programme. This pilot programme operates as a public-private partnership, whereby MoIC provides subsidized credit to millers through state banks and the millers keep a specified minimum rice stock. Still, the exact mechanics of the NRR are not clear. Discussions with MoIC indicate that the current programme continues to be a pilot programme under which funds were transferred to the Foodstuff Enterprise Company (directly controlled by Vientiane Municipality), which then established contracts with two millers. The millers received credit in the amount of Kip 10 billion at an interest rate of 5 percent a year (versus the current market

38 According to most discussions held with stakeholders, most of these quotas have not been fulfilled. As indicated in the previous chapter, this may be due to the poor quality for the price of Lao rice, but also can be due to the burdensome administrative procedures involving PICO and MoIC authorizations. It should be stressed that the main factor affecting Lao rice exports is not tariff free access, but the issue of quality/price. While Lao paddy prices are more competitive at farmgate when compared with those of Viet Nam, Lao milled rice becomes more expensive at ex-mill prices than Vietnamese rice of comparable quality. This becomes essentially a more significant barrier for Lao rice exports than quota, which is the main rationale for allowing paddy exports. Furthermore, there may also be informal fees linked to the use of the quota system by traders, as it requires numerous interaction and paperwork with PICO and MoIC.

interest rate of around 13 percent) in exchange for keeping stocks of rice[39], which are estimated at around 5 000 tonnes.

Finally, in addition to these trade-related measures, government also intervenes through direct procurement of rice for distribution as part of pay to public officials: the State Food Enterprise of Laos is tasked with procuring rice for military personnel and public sector employees; procurement averages about 25 000 tonnes of rice per year. According to field discussions, these purchases may include very interesting terms for the millers involved because there are substantial advance payments and the supply schedule is quite flexible throughout the year.

Extension

MAF operates its agricultural research programme through NAFRI and its extension programme through NAFES. Both NAFRI and NAFES have active and long-term collaboration with a number of international institutes. The Lao Extension for Agriculture Project (LEAP) contributes to the institutional development of NAFES. The cornerstone of LEAP, which uses the Lao extension approach (LEA), is structured in two parts, namely the Government Extension Service and the village extension system (VES). During the initial phase of LEAP (2002 to 2004), LEA was developed and tested with more than 1 600 farmers in 96 villages, covering areas with different agro-ecological conditions and potential. An analysis of that experience showed that the LEA-applied processes and principles helped farmers increase rice yields by an average of 43 percent.

The Lao Government Extension Service consists of three levels:

- NAFES, which has the status of a department within MAF. Since it was established in August 2001, NAFES has been the lead extension institution in the Lao PDR.
- The Provincial Agriculture and Forestry Extension Centre (PAFEC), which is located in the Provincial Agricultural and Forestry Office (PAFO). PAFEC is staffed with about five to seven subject matter specialists (SMSs) in training and extension methodology and coordinates with other SMSs from the technical sections of PAFO to strengthen the capacity of the staff of the District Agriculture and Forestry Extension Office (DAFEO).

39 Information about the NRR was gathered during discussions with MoIC.

- At the district level, the DAFEO, which is staffed by generalists who have an agricultural background, but concentrate on providing training and service to the farmers. DAFEO staffs are responsible for certain cluster areas and are called farming system extension workers (FSEWs).

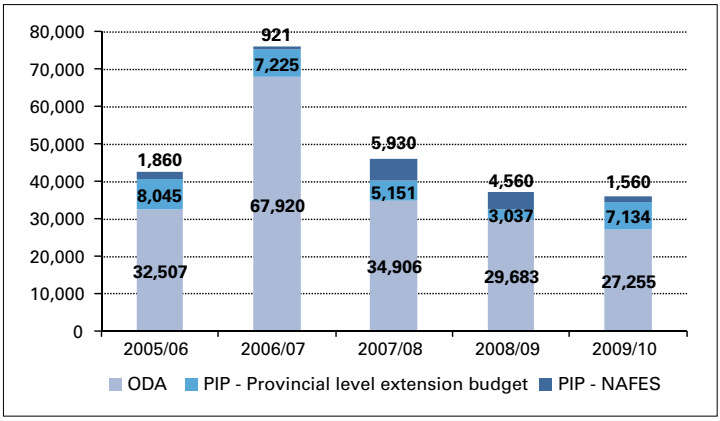
The Village Extension System has the following components:

- The village authorities, both formal and informal, who take a leading role in planning and organizing local development activities.
- The production groups, made up of farmers with a common interest, who undertake learning projects with the objective of solving a particular problem and/or learning about particular techniques.
- The village extension workers (VEWs), mandated by the village authorities and production group members to facilitate extension activities in collaboration with the staff of the DAFEO and other related stakeholders.

Over the last five years, MAF's public investment programme (PIP) for NAFES at the central level has expended on average around USD 370 000 annually (in constant 2011 Kip). It is not easy to distinguish PIP local-level extension expenditures (that are direct budget transfers to provincial governments), given the way they are reported, but, according to MAF data, they would have averaged around USD 765 000 annually (FIGURE 30). This means that, excluding Overseas Development Assistance (ODA) and taking into account the number of rice growers in the Lao PDR, PIP expenditure for extension averages around USD 1.1 million per year or USD 1.60 per farmer. In contrast, ODA spending on extension has averaged about USD 4.8 million per year (in constant 2011 Kip) over the last five years.

In total, public extension spending accounted for a total of 10 percent of total agriculture expenditure over the last five years. Besides limited funding for recurrent expenditures, there is also an issue of insufficient staffing levels, which limits the scaling-up of the delivery of extension activities. In 2011, NAFES had 141 staff located centrally in Vientiane Municipality, in addition to 1 076 staff located across the country.

FIGURE 30
Total expenditure for extension, 2005/06–2009/10 (in constant 2011 Kip million)



Source: NAFES and MAF Department of Planning data and the authors' calculations.

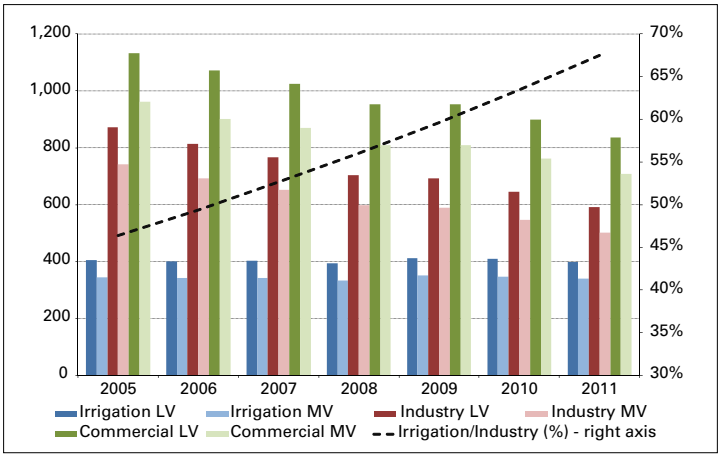
Donor funding for LEAP ended in June 2012. NAFES is embarking on developing a new strategic direction for extension for the period 2011–2020. The philosophy underpinning the new strategy is for NAFES to play more of a facilitation role in the delivery of extension services to farmers. As stated in the strategic planning document, "The future priorities of NAFES extension will focus on smallholder groups in disadvantaged areas and to disseminate information on diversified options to improve food security, incomes and resilience."

Irrigation

In order to address food security in the 1980s, the Lao PDR provided special support to irrigation development in order to accomplish the national goal of food security. According to MAF data, dry season irrigated area expanded at an average annual rate of 20 percent between 1991 and 2000. Approximately 7 000 pumps, most of which were diesel pumps, were installed along the Mekong River and its major branches (MAF, 2008) in the early 1990s.

Irrigation is an important support policy of the Lao PDR for the rice sector. It includes two key support measures: (i) direct input subsidy through reduced tariffs for electricity used in irrigation, and other operations and maintenance costs; and (ii) full subsidy of costs of irrigation system development.

FIGURE 31
Cost of electricity for irrigation and to industry and commerce (in Kip/kwh constant 2011 prices)



Source: Data from the Department of Irrigation (DoI) and the authors' calculations.
Note: LV = low voltage; MV = medium voltage.

The government has established low tariffs for power supply to pump irrigation relative to other sectors of the economy, effectively subsidizing the pumping costs. Since 2005, the subsidy has been diminishing. As seen in FIGURE 31, cost of electricity for irrigation (in Kip/kwh) represented just about half the cost of electricity to industry (and around one-third the cost for commerce). Another interesting feature is that while rice producers are worried about rising electricity costs, in real terms, the cost per unit of electricity was actually marginally lower in 2011 relative to 2005.

Notwithstanding the energy subsidy, the government has difficulty collecting electricity charges from farmers, which means that the actual magnitude of the subsidy is even larger. According to discussions held with the Department of Irrigation (DoI), only around 30 percent of electricity charges were collected. Assuming full payment of electricity charges by the industrial sector, this means that the cost of electricity to irrigated agriculture is just 20 percent of that incurred by industry. The subsidy is not only supporting irrigated agriculture relative to sectors other than agriculture, but also de facto supporting rice over other agricultural subsectors. This is because,

while the subsidy does not directly target rice growers, it does so indirectly because they are the main users of irrigation.

The difficulty in collecting water fees has also resulted in an accumulated debt on the part of DoI with the national utility company Electricité du Laos (EDL)[40]. The debt at April 2012 amounted to approximately USD 11.9 million, up from USD 8.1 million in 2011 (TABLE 7). No funds are available to DoI so it cannot pay down the accumulated debt to EDL and, therefore, it normally relies on debt cancellations by government as happened in 2005 (which explains the drop in DoI's indebtedness in 2006). It was not possible to collect an actual annual figure for DoI electricity pumping costs, but discussions with DoI and subsequent calculations based on an average number of hours worked and the typology of pumps suggest an annual (including dry and wet season) electricity pumping cost of between Kip 20 and Kip 25 billion (about USD 2.5 to USD 3 million, which is close to the observed increase in indebtedness to EDL). Based on numbers of farmers with irrigated land (between 80 000 and 100 000, depending on the source), one can estimate an annual direct budget transfer in the range of USD 25 to USD 35 per household. In theory, there is also a subsidized cost for maintenance and operation of the pumps and main canals but, according to DoI, the annual budget is very limited for this purpose. There is significant deferred maintenance, which has led to the deterioration of many systems built in the 1990s.

40 Electricité du Laos (EDL) is the state corporation of the Lao PDR that owns and operates the country's electricity generation, electricity transmission and electricity distribution assets.

TABLE 7
Summary of DoI's indebtedness to EDL due to electricity pumping costs, 2005–2010 (current USD)

Province/ municipality	2005	2006	2007	2008	2009	2010
XB Xayabury	0	0	459	0	575	588
VP Vientiane	234 005	101 181	61 336	71 674	68 186	77 259
VM Vientiane Municipality	2 845 626	215 857	673 033	588 748	532 594	830 810
BK Bokeo	81 793	4 778	17 269	3 160	3 056	76 510
KM Khammuane	125 502	44 763	45 581	27 273	58 546	179 097
SV Savannakhet	50 982	95 290	26 772	100 567	83 146	167 408
SRV Saravan	0	0	20 524	22 427	25 333	66 729
CP Champasack	102 494	79 056	18 703	47 898	16 908	125 757
AT Attapeu	36 438	18 168	15 196	10 269	12 719	14 450
Total	**3 476 841**	**559 093**	**878 872**	**872 016**	**801 064**	**1 538 608**

Source: MAF, DoI, Vientiane, 2011.

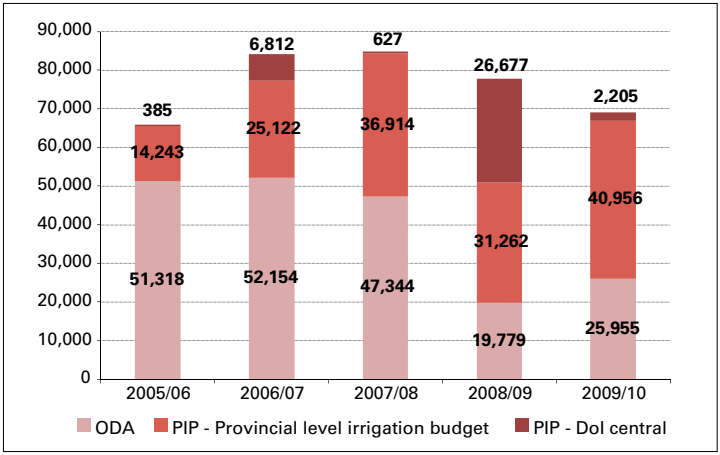
The second key support measure is public investment in irrigation infrastructure for which farmers are not expected to pay (both new and rehabilitation of existing schemes). In 2009–2010, about 2 866 irrigation schemes were registered across the country. Water user associations (WUAs) have been established in 68 irrigation schemes and water user groups (WUGs) in 933 irrigation schemes. WUGs were established upon completion of a scheme and generally involved village-based organizations and administration; a relatively few WUGs have been institutionalized under the regulatory framework as WUAs. In the remaining 1 865 schemes, no WUGs have been set up[41].

Over the next four years (to 2015/16), DoI plans an increase in irrigated rice cropping area (both new and rehabilitated irrigation systems) of 114 000 ha for wet season cropping with supplementary irrigation and 83 000 ha for dry season irrigated cropping in the northern, central Vientiane and southern plains. This represents nearly a 100 percent increase in wet season cropping area with supplementary irrigation and a 110 percent increase in dry season irrigated cropping area. A significant amount of funds will be required to meet the planned expansion (more details in Chapter 5).

41 Data and information provided by MAF in unpublished reports.

Regarding total spending on irrigation in the Lao PDR, the average PIP outlay over the period 2005/06–2009/10 was around Kip 37 billion annually at constant 2011 prices (around USD 4.6 million), of which 80 percent came from provincial budgets (which was transferred directly from the MoF) (FIGURE 32). Investments in irrigation are substantially greater than those in extension. In fact, irrigation is the highest expenditure item for MAF, amounting to almost a quarter of the total central budget. If one includes provincial expenditure with expenditure on agriculture, then irrigation expenditure represents around 42 percent of the total compared with around 10 percent for extension-related activities. Still support to irrigation through budget allocations only benefits around 10 percent of all rice growers in the Lao PDR.

FIGURE 32
Total expenditure for irrigation, 2005/06–2009/10 (in constant 2011 Kip million)



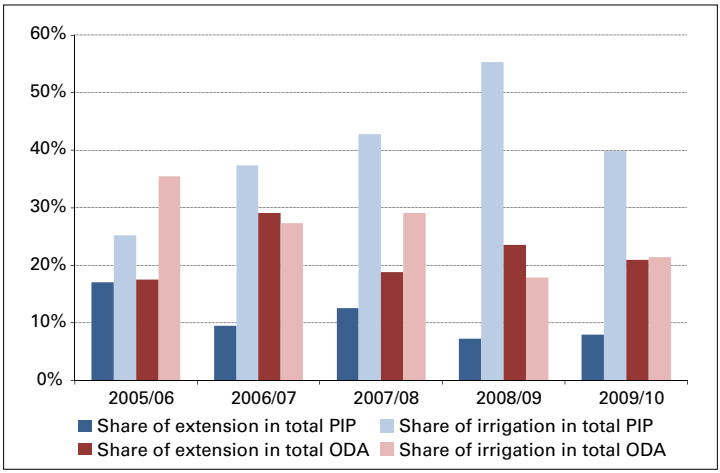
Source: DoI and MAF Department of Planning data, and the authors' calculations.

In FIGURE 33, we also show the relative importance of ODA and PIP in extension and irrigation investments in the 2005/06 to 2009/10 period. It is interesting to note that ODA expenditure[42] in extension as percentage of all agricultural spending has actually increased and in 2009/10 represented around 21 percent, approximately the same

42 Data on ODA expenditure comes from the MAF Department of Planning. It is not fully clear whether all donors provide enough details on their expenditure in agriculture and to what extent the figure is fully accurate. Still, discussions held in Vientiane Municipality with development partners suggest that the trends observed are correct.

investment amount as for irrigation. In contrast, public spending through PIP favors irrigation over extension.

FIGURE 33
Comparison of share of extension and irrigation spending to total agricultural spending by government and Overseas Development Assistance



Source: DoI and MAF Department of Planning data, and the authors' calculations.

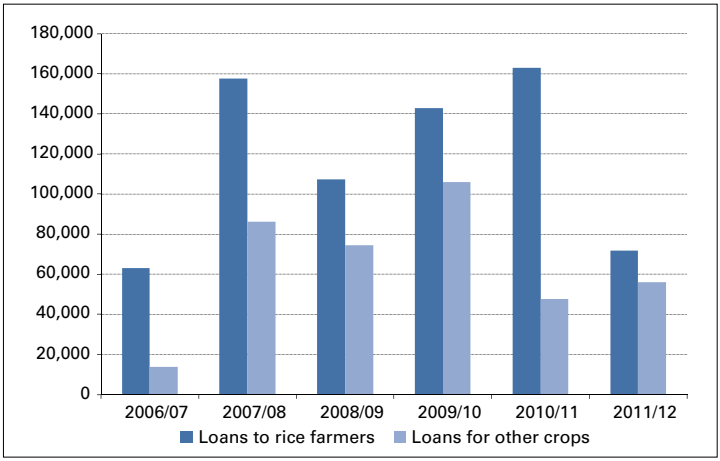
Credit

In the Lao PDR, an important item of support policies in addition to extension and irrigation is subsidized credit to farmers. There are two major state-owned banks that provide credit to farmers through group lending with joint liability. The largest one is the Agricultural Promotion Bank (APB), which provides seasonal credit specifically targeted to farmers of rice but also other crops (mainly maize, cassava and tobacco, depending on the year). The credit is currently provided in the form of a seasonal loan, with farmers' groups of five to ten households being eligible for a maximum loan of Kip 10 million. Currently, the interest rate is 8 percent versus a market rate of around 13 percent. In 2011, the APB loaned about Kip 2 635 billion (USD 329 million), and 4.4 percent of the loans were non-performing loans. Of the APB's total loan portfolio, around 35 percent of loans, representing USD 115 million, are for agriculture. The bank has seen a significant increase in its loan portfolio since 2007, when the total portfolio represented USD 40 million, half of which was agricultural-related lending. Non-performing loans in agriculture over the last four years have

represented a similar percentage relative to that of non-performing loans in the overall bank portfolio.

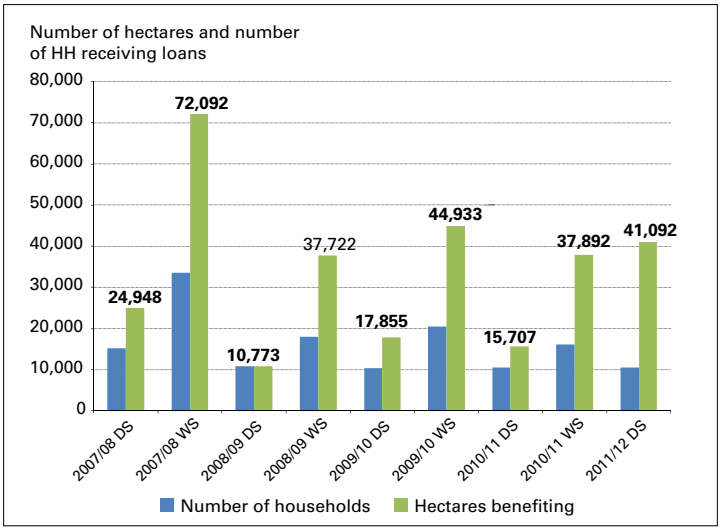
In terms of loans for all crop production, FIGURE 34 shows the evolution of APB loans to rice farmers versus farmers of other crops. Loans for rice production are still dominant and represent between 56 and 82 percent of total loans for all crop production over the last six years. In addition, loans for wet season rice cropping represent between 60 and 70 percent of total annual loans granted by the APB to rice growers. Finally, 35 shows the total number of rice growers and area cultivated that have benefited from loans over the last six years by season. The figures show that on average around 16 000 households organized in 1 900 farmers' groups and with total land area of 33 700 ha received loans each season. The average loan in 2010/11 was the equivalent of about USD 700 per household. This means that, as with irrigation, subsidized credit through the APB tends to be reaching a small portion of all rice growers in the Lao PDR (just above 2 percent) and that farmer beneficiaries own large land plots that average around 2.1 ha.

FIGURE 34
Loans to rice farmers and for other crops and the area cultivated (ha), 2006/07–2011/12 (in constant 2011 Kip million)



Source: APB and the authors' calculations.
Note: The data for 2006/07 includes only wet season, and 2011/12 data includes only dry season.

FIGURE 35
Number of hectares and rice-farming households benefiting from loans, 2006/07–2011/12



Source: APB and the authors' calculations.

The other main source of subsidized credit is the Nayoby Bank (NBB), which started operations in 2006. Unlike the APB, NBB's mandate is to target only the 47 poorer districts in the country. The NBB has similar loan conditions to those of the APB but has a much smaller loan portfolio. It has three main credit products at present: (i) short-term credit (not more than 12 months) at a 7 percent annual interest rate; (ii) medium-term credit (maximum 36 months) at an 8 percent annual interest rate; and (iii) long-term credit (more than three years) at a 10 percent annual interest rate. In 2011, the NBB total value of loans granted rice farmers amounted to around Kip 22 billion or (USD 2.8 million). This volume of lending has been constant since 2008. The loans benefit annually on average almost 8 000 rice farmers organized in groups. The average loan per household amounts to around USD 350.

Rice producer support estimates

We use Producer Support Estimates (PSEs) to assess the degree to which rice producers in the Lao PDR are being taxed or supported as a result of the current policy mix (more details on the methodology are provided in Annex 2). The PSE methodology has been developed by the OECD to monitor and evaluate the level and composition of support to agriculture by governments. It is commonly used in trade

negotiations to determine the degree to which countries protect their agricultural producers. The PSEs with associated indicators are normally calculated for the agricultural sector as a whole but also for individual commodities. In this section, we only provide estimates for the rice sector[43].

The PSE for rice includes all transfers to rice producers from both consumers and taxpayers, arising from policy measures, and has two major components:

3. Explicit transfers or budgetary payments. In the case of the Lao PDR, these would include mainly tranfers/payments for irrigation development and subsidized water provision, subsidized credit to producers, dedicated support to rice producers on extension, etc.; and
4. Implicit transfers or market price support (MPS). MPS estimates the difference between domestic prices and world (reference) prices. Domestic prices are measured at farmgate and are then adjusted for comparison with world (reference) prices.

In the Lao PDR, the PSE for rice was conducted from 2005/06 to 2010/11. The difficulties in obtaining detailed expenditure data for some of the key items made it necessary to make a number of assumptions. The analysis uses information gathered in the above section to identify the following main explicit transfers to rice producers:

- Electricity subsidy for irrigation. Using data on estimated electricity consumption and the different electricity rates per year, the subsidy has been calculated at 70 percent of the total cost of electricity to producers. While the subsidy to agriculture is, theoretically, the difference between EDL electricity fee rates for agriculture and those for other sectors, in reality, discussions with officials point to the non-payment of the water fees by farmers. Therefore, a full subsidy of 70 percent of the total cost of electricity has been used in the calculations and would constitute the upper bound estimate of government support.
- Irrigation operations and maintenance (besides electricity costs). As described above, government helps rice farmers in the Lao PDR by

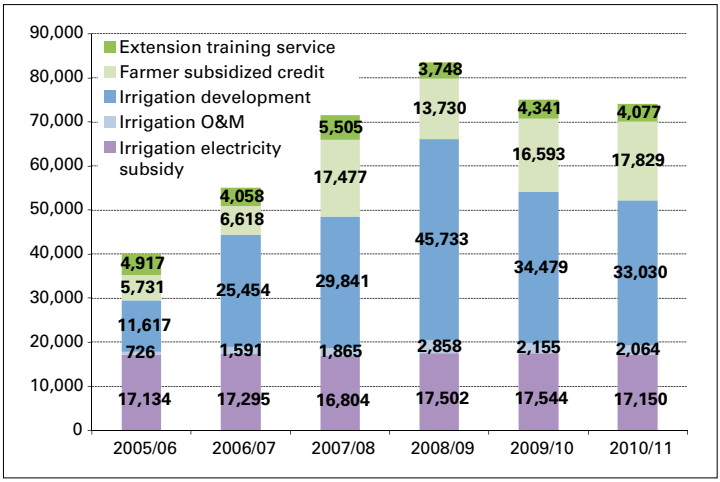
43 While this report does not attempt to calculate PSE for all agricultural commodities in the Lao PDR, rice certainly represents a large share of agricultural value addition. PSE for various commodities and the aggregation for the agricultural sector would also require additional analysis, namely how rice is supported relative to other agriculture subsectors and what this means for farmer incentives. This may be a topic for future research.

taking responsibility for the maintenance and operation of pumps and main canals. While funding requirements would be great, actual budgetary allocations are quite small and have been assumed at 5 percent of total irrigation spending (central and local).

- Credit to farmers through state-owned banks. The analysis accounts for the loans directed to rice farmers annually by the two main institutions: the APB and the Nayoby Bank. The support measure is calculated as the difference between the interest rate that farmers would normally have to pay and the subsidized interest rate offered by these institutions: a 10 percent difference in rates has been assumed for APB and a 12 percent difference for NBB. It results in an alternative rate for farmers of 18 to 20 percent a year, which is around 5 to 8 percentage points higher than market interest rates . While one could argue that some of the farmer beneficiaries would not have access to credit otherwise (or would have access at rates much higher than 18 percent), there are also extra administrative costs for farmers when dealing with these banks.
- Irrigation development costs (new irrigation and rehabilitation of existing schemes). These transfers relate to fixed capital formation and constitute full subsidies for individual rice farmers (normally organized in groups). Following discussions with MAF's DoI, it was estimated that around 80 percent of total government expenditure for irrigation is for irrigation development.
- Extension services have been also included in the Lao rice PSEs. The amount of transfer has been calculated based on the total NAFES budget at central and local level, of which 50 percent has been assumed to be directly allocated to the training of rice farmers, following discussions with MAF officials.

The total value of budget transfers to rice producers stood at around Kip 74.2 billion (around USD 9.3 million) in 2010/11. Given the conservative nature of our assumptions, this figure could be considered as an upper bound estimate of public sector support to rice producers. As can be seen in FIGURE 36, budget transfers are made to that small group of producers which is involved with irrigated cropping, as they are essentially driven by (i) irrigation-related expenditures (electricity subsidy and irrigation construction and rehabilitation) and (ii) subsidized credit. This is not unusual for countries with a level of per capita income such as that in the Lao PDR and mainly reflects the limited funds available and the focus on maximizing production per ha.

FIGURE 36
Budget transfers to rice producers, 2005/06–2010/11 (in constant 2011 Kip million)



Source: MAF, the APB, the Nayoby Bank and the authors' calculations.

MPS arises mainly as a result of policies affecting the difference between market reference and producer prices. It measures market functioning (or malfunctioning) of domestic markets for a given commodity. Because of its importance, it is relevant to present some of the key assumptions underlying its estimation (for more details see Annex 2). In the calculations presented below we use Lao average national farmgate glutinous paddy prices collected by FAO during from January 2006 to February 2011 (MAF and MoIC do not collect farmgate price data). For the missing months, average national retail-level glutinous rice prices are used (data collected by MoIC) and the average historical margin between farmgate and retail prices is applied (extrapolated from the months when both sets of data are available). For reference prices, data from Thailand is used, namely for F.O.B. glutinous rice 10 percent broken. Thailand is used as a reference market because of its size and the fact that it is a known export market for Lao glutinous rice, albeit informally. The margins are estimated based on data collected during interviews with millers and traders in the Lao PDR. Conservative assumptions about transportation and handling costs have been used.

The first step in the estimation of MPS is the analysis of the nominal protection rate (NPR) coefficient, which is the difference between the

value of domestic output of the commodity in farmgate prices and reference (border) prices, adjusted for transportation, handling and processing costs (reference prices at farmgate level). NPR does not take into account support provided for inputs to agriculture.

NPR is an indicator of support (if positive) or implicit taxation (if negative) of agricultural producers. Alternatively, it shows whether producers are protected from foreign competition or taxed, which would put them at a comparative disadvantage with their competitors[44]. It mainly reflects the result of tariff policy and quantitative and qualitative trade barriers, but also all government policy actions that affect domestic prices for agriculture, directly or implicitly, such as setting minimum producer and export prices. In most developing economies, NPR demonstrates support to import substitution sectors, but in the Lao PDR, the situation is different as can be seen in TABLE 8. The table shows estimates for the Lao NPR relative to glutinous rice and sensitivity to two key parameters that affect the efficiency of the domestic rice industry and, therefore, the calculations of margins between domestic and reference prices. The results suggest that domestic rice producers' welfare is not being supported by current trade and price policies compared with the reference (non-policy) situation (i.e. for most years NPR is negative). This is the case even if a quality adjustment of 90 percent instead of 100 percent is used for the final product (TABLE 8 – more conservative quality adjustment)[45]. In addition, NPR would also be negative even using a lower average milling rate of 58 percent instead of 60 percent. If we combine both more conservative assumptions, the NPR in 2009/10 and 2010/11 would still be negative.

44 In the FAO MAFAP methodology, this is known as a market development gap.

45 The reason why the base case scenario uses a 100 percent quality adjustment between the price of the final product from the Lao PDR and the Thai reference price is that the reference product is Thai glutinous rice 10 percent broken.

TABLE 8
Nominal protection rate estimates for glutinous rice, 2005/06–2010/11 (%)

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Base case	**-9**	**-34**	**-13**	**13**	**-20**	**-26**
More conservative quality adjustment	8	-24	1	33	-8	-16
Lower milling rate	-5	-31	-9	18	-17	-23

Source: MAF, the APB, the Nayoby Bank and the authors' calculations.

Most importantly, the resulting magnitude of the negative MPS is such that it dwarves all other positive support measures by government, which were discussed above. This is illustrated in TABLE 9, which shows the results of the PSE for Lao glutinous rice and its composition in terms of MPS and budget transfers. The taxation of rice producers results mainly in the form of very high transfers from producers to consumers, which are almost thirty-six times the value of budget transfers from taxpayers to rice producers, i.e. total MPS results in a Kip 3 141 billion transfer from producers to consumers versus around Kip 74 billion in positive budget transfers from taxpayers to producers.

Essentially, the positive effect of public spending on rice production is more than outweighed by trade policies, namely export bans and price ceilings, which lead to overall taxation of rice growers in the Lao PDR[46]. This is based on two factors. First, there is a significant gap between farmer and reference prices, even if very conservative processing, transportation and handling margins are used. Second, discussions in the main rice production regions in the Lao PDR suggest that there is significant informal trade with neighbouring countries and this translates into price integration in the region, as already discussed in Chapter 3. So if prices in the Lao PDR follow those in the neighbouring countries, it means that trade bans and other obstacles are not fully efficient in stopping trade. However, as in most countries, this probably results either in excessive costs to cross the border (through informal payments) or in higher risks to export without having made informal payments (which in turn results in a need for higher returns).

46 It should be noted that this analysis uses only government policies and programmes and does not include donor funded programmes affecting rice. However, even considering donor support to rice producers would not make much difference in the conclusions: all ODA support to MAF in 2009/10 (for all agricultural subsectors combined) amounted to USD 14 million, which amount was still dwarfed by the negative MPS.

TABLE 9
PSE for glutinous rice, 2005/06–2010/11 (Kip billion)

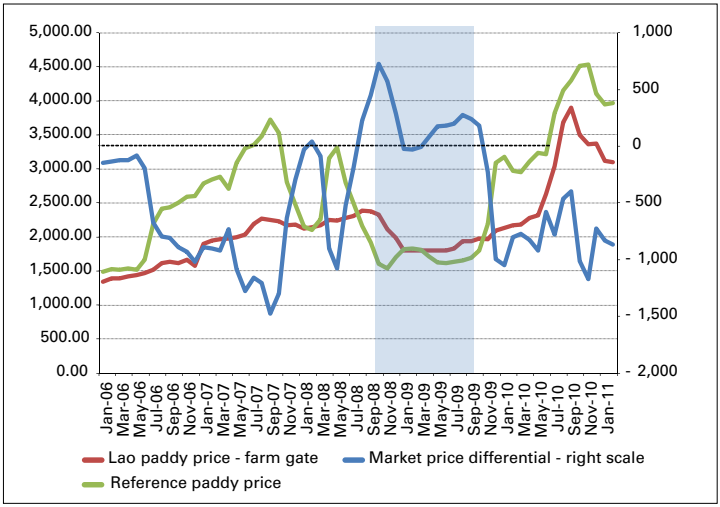
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
MPS	**-332**	**-2 373**	**-840**	**619**	**-1 703**	**-3 141**
Transfers to producers from consumers	-268	-1 992	-698	491	-1 381	-2 529
Transfers to producers from taxpayers	-64	-38	-142	128	-323	-612
Budget transfers (BT) (from taxpayers to producers)	**32**	**45**	**63**	**74**	**70**	**74**
PSE (single commodity transfer) (PSE=MPS+BT)	**-301**	**-2 328**	**-777**	**694**	**-1 633**	**-3 067**

Source: Data from MAF, millers and state-owned banks, and the authors' calculations.

The only period when the PSE estimate is positive is 2008/09. In order to explain this, we conduct a monthly analysis by plotting the Lao farmgate prices, the estimated reference prices based on actual monthly Thai F.O.B. prices for glutinous rice and the estimated costs of handling, profit margins, etc. As can be seen in FIGURE 37, the shaded area shows the period for which PSE is positive due to a positive differential between the reference prices and the producer prices. This was a time of turmoil in international rice markets (for non-glutinous at least), following bans imposed earlier by India and also Viet Nam. In particular, around November 2008 (at the beginning of the shaded period shown in the figure), the Thai Government started selling its carryover stocks of 600 000 tonnes of the 2008 dry season rice crop and around 2 million tonnes of crops of previous seasons (Slayton, 2009), which also explains the drop in the Thai price of glutinous rice. What is interesting is that such a drop does not seem to be accompanied fully by a drop in the Lao prices. A possible explanation is that, given the share of traders' and millers' margins in the handling and transportation costs, the traders and millers may have lowered their margins during 2008/09 in order to continue trading. Despite a margin reduction, they could still make a small profit and the PSE would become negative again. By simulating the elimination of the profit margin of agents, the PSE also becomes negative during this period as well as in the rest of the months analysed.

In addition, a trade ban was imposed at the end of 2008 as a result of floods that affected production, at least in affected provinces. Depending on the specific conditions, this could also have provided some reasons for the evolution in Lao prices. However, as discussed in Chapter 3, it is most probable that the lower incentives to export (due to lower Thai prices) was more important than the ban.

FIGURE 37
Farmgate and reference prices and the differential (Kip/kg in paddy terms)



Source: Data from MAF, millers, state-owned banks and FAO, and the authors' calculations. The dotted line indicates a "zero market price differential".

5. Simulations on Policy Targets and Rice Balance Scenarios

In this chapter, we present the results of the simulation analysis of factors that will affect future rice production and consumption trends in the Lao PDR until 2020. It seeks to provide insights to what can reasonably be expected from the rice sector going forward and this is done in two parts. First, simulation runs are carried out for total paddy production volume and rice surplus for 2011 to 2020 based on various assumptions about production trends and demographic changes. Next, various public investment options are considered for 2013 to 2015 and their relative efficiency is analysed.

Expected Evolution of the Lao Rice Balance with the Current Policy Mix

Rice production and consumption scenarios

In the past, public investments in the rice sector in the Lao PDR have primarily focused on increasing the paddy production for the purpose of achieving rice self-sufficiency. It is believed that the Lao PDR first achieved rice self-sufficiency in 1999, although, given the problems in measuring actual consumption levels and the lack of precise estimates of the technical parameters that affect rice utilization (i.e. post-harvest losses, milling rates, use for animal feed and by industry), it is likely that the country achieved rice self-sufficiency in the early 1990s.

A detailed simulation analysis was undertaken for alternative scenarios of rice production, rice consumption, and the resulting balance of exportable surpluses between 2012 and 2020. Considerations were given to a wide range of variables, including projections for the expansion of area and growth of rice yields, post-harvest losses, milling rates, non-food consumption of rice, and demographic change (i.e. population growth and degree of urbanization, per capita rice consumption).

Time series data on production and yields was gathered for the 1990 to 2011 period from various sources (MAF, FAO, IRRI). The assumptions about non-consumptive uses of rice come from studies conducted by FAO and IRRI, and have been verified with technical experts. Population data for 1995 and 2005 and growth projections come from NSC.

Production estimates. The production scenarios build on recent historical trends in area expansion and yield growth, which reflect the current public policy environment and levels of spending for the sector. TABLE 10 presents the data on historical growth rates of rice area expansion and yield in the Lao PDR over the 1991–2001 period. There was steady growth in the size of the wet season lowland rice area during the 1990s and the first half of the 2000s, but a significant slow down in the second half of the 2000s. Wet season paddy areas made up 77 percent of the total rice land area in the Lao PDR in 2011, up from 63 percent in 1991. Similar trends apply to the upland rice area, which saw a steady decline between 1991 and 2001, followed by significant acceleration during the early part of the 2000s. Upland rice area now makes up about 10 percent of the total rice area, down from 41 percent in 1991. Finally, we observe significant fluctuation in the growth in irrigated paddy area size, which experienced impressive growth rates in the 1990s (driven largely by investments in the second half of the 1990s), followed by a sharp decline in size of irrigated area in the first half of the 2000s; growth then resumed in the second half of the 2000s. Overall, the percentage of irrigated dry land paddy area to total rice area increased from 2 percent in 1991 to 12 percent in 2011.

Similar trends apply to growth trends of rice yields. Wet season rice yield growth declined from about 2 percent per annum in 1990s and the first half of the 2000s to 0.7 percent per annum during the second half of the 2000s. The large share of wet season paddy also drives the growth rate of the average rice yield growth rate, which saw a steady decline from 3.4 percent per annum in 1990s to 1.3 percent per annum in the second half of the 2000s. In fact, 80 percent of rice yield gains between 1990 and 2010 was achieved in the period up to 2002.

TABLE 10
Annual growth in the size of rice area (%) and yield (%), 1991–2011

	Wet season lowland		Dry season		Upland rice		Total rice area	Average rice yield
	Area %	Yield %	Area %	Yield %	Area %	Yield %		
1991–2000	3.4	2.1	21.3	2.0	-4.3	1.7	2.0	3.4
2001–2005	3.2	1.9	-9.8	2.7	-7.8	3.0	-0.3	2.6
2006–2010	1.9	0.7	8.2	1.7	-2.6	0.7	2.0	1.3

Source: MAF data and the authors' calculations.

The simulation analysis develops three scenarios for future production trends. The base case scenario assumes the continuation of historical growth rates from the late 2000s. We assume that the average annual growth rate in the size of wet season paddy area will be 2 percent for 2011–2015, and it is expected to decline to 1.5 percent due to increasing land and labour limitations. The annual increase in wet season paddy area will remain at 0.7 percent for the entire 2011–2020 period. Dry season paddy area is assumed to increase at an annual rate of 7.5 percent for the 2011–2015 period and 5 percent during the 2016–2020 period, which reflects the increase in cost to access water and the decline in the area of land suitable for irrigation development. It also reflects the recent investments for the rehabilitation of irrigation infrastructure in the Lao PDR that may not be counted as yet in official national statistics. The dry season yield growth is expected to be 1.7 percent per annum for the entire 2011–2020 period, which is comparable with annual yield growth rates in the 1990s and the 2000s. The base case scenario for upland rice area assumes a continued gradual decline in area size (albeit at slower than historical rates) due to the continued conversion of arable land to cash crop cultivation (i.e. rubber, bananas and maize) and to land use restrictions set by slash and burn policies, while the yield growth is derived from the historical trends.

Under the base case scenario, the total annual growth of paddy production will continue to be 3 percent during the 2011–2015 period (which is similar to the average growth rates during the 1990s and the 2000s), but below the government policy target of 6 percent that is required to achieve the 4.2 million ton paddy production target. The annual growth rate for the 2016–2020 period is expected to decline to 2.4 percent. TABLE 11 presents the assumptions for the base case along with the high- and low-case scenarios.

TABLE 11
Assumptions for production scenarios, 2011–2020

		Wet season lowland		Dry season		Upland rice	
Scenario run	Period	Area %	Yield %	Area %	Yield %	Area %	Yield %
			tonne/ha	ha	tonne/ha	ha	tonne/ha
Low case	2011–2015	1.5	0.5	5.0	1.5	-1.0	0.5
	2016–2020	1.0	0.5	3.0	1.5	-1.0	0.3
Base case	2011–2015	2.0	0.7	8.0	1.7	-0.5	0.7
	2016–2020	1.5	0.7	5.0	1.7	-0.5	0.5
High case	2011–2015	2.5	1.0	8.0	2.0	-0.5	1.0
	2016–2020	2.0	1.0	5.0	2.0	-0.5	0.7

Source: Assumptions by the authors for the 2011–2020 period.

Post-harvest losses and non-consumptive use of rice. MAF uses a 12 percent estimate for post-harvest losses, which comes from a 1995 FAO study. The simulation model scenario calculations assume conservatively no change in this assumption. The milling ratio for the 1990–2010 period has been estimated as 60 percent. Under the simulation scenarios, it is assumed that the milling ratio would increase to 61 percent during the 2011–2015 period and to 62 percent during the 2016–2020 period. This reflects the increasing private sector investments in rice milling facilities over the past years and this trend is expected to continue in the future[47]. Seed use is calculated assuming average use of 100 kg of seed (in paddy equivalent) per ha[48]. 7This translates into 4 percent of total paddy production during the 1990s, which is also the figure used by MAF, but declines to 3 percent during the 2000s and the 2010s. It is expected to be a reasonable estimate, which reflects the increasing use of improved seeds and farming practices by producers. Finally, animal feed use of total milled rice is assumed to be 3 percent throughout the 1990–2010 period. It is expected to increase to 4 percent during the 2011–2015 period and further to 5 percent during the 2016–2020 period, which reflects the increasing demand for livestock and poultry products. Industrial use of milled rice is assumed to be 8 percent throughout the 1990–2010 period and is expected to increase to 9 percent during the 2011–2015

47 The International Finance Corp. (IFC) and the Netherlands Development Organisation (SNV).

48 NAFRI advocates the optimal seed use of about 60 kg per ha.

period and to 10 percent for the 2016–2020 period. Both of these estimates are higher than those used by MAF in its rice balance sheet calculations.

Demographic variables. The parameters of production and non-consumptive use of rice discussed above provide information about the amount of milled rice available for human consumption. The level of human consumption, however, is not a constant factor but evolves over time based on underlying demographical changes, which are themselves driven by broader economic development in the Lao PDR and Lao PDR's regional integration through the movement of labour and migration patterns. Human consumption is probably the single most important determinant of the level of rice surplus that would be, in principle, available for export. An errors in the estimation of the consumption level could lead to vastly different policy conclusions with serious consequences (i.e. should rice policy focus on national food security and rice availability or exports). We will discuss in turn the demographical parameters that are expected to affect the aggregate national consumption level of rice.

Population growth rate. The National Statistics Centre (NSC) of the Lao PDR has developed population projections from 2005 to 2020. The NSC uses two scenarios for the population growth rate[49]. Base case scenario assumes that the natural growth rate of the population will decline from the historical level of 2.4 per cent per annum to 1.9 percent by 2015 and to 1.4 percent by 2020. Furthermore, the NSC argues that the actual population growth rate is expected to decline to 1.1 percent per annum by 2020 due to negative net migration. The NSC estimated that population size under these assumptions will reach 7 260 000 people by 2020. We treat these projections as the base case scenario for the population growth rate from 2011 to 2020. The low case scenario assumes the continuation of the historical population growth rate from the 1990s and early 2000s of 2.4 percent per annum, which would give total population by 2020 of 7 990 000 people. The high case scenario assumptions for population growth are assumed to be same as for the base case scenario.

Urbanization. According to the 2005 Lao Population Census, the percentage of urban population to total population was about 27 percent in 2005. The urbanization growth rate has been nearly 4

49 See http://www.nsc.gov.la/Products/Populationcensus2005/PopulationCensus2005_chapter9.htm

percent per annum during the 1990s and early 2000s. Given that urban population tends to consume less rice than rural population, the urbanization rate has, thus, important implications for national rice consumption and exportable surpluses. The base case scenario assumes that the urbanization growth rate continues at 2 percent per annum for the 2001–2015 projections, and drops to 1.5 percent per annum for the 2016–2020 period. This would result in an urban share of population of 36 percent of total population by 2015 and 39 percent by 2020. The high case scenario assumes an annual urbanization rate of 3 percent for the 2011 to 2015 period and 2.5 percent for the 2016–2020 period. Under this scenario, the urbanization rate in the Lao PDR is expected to reach 38 percent of total population by 2015 and 43 percent by 2020, which is compatible with historical growth rates. The low case scenario assumes that the urbanization rate will be below its historical trends. It assumes that urbanization rate growth will be only 1 percent per annum for the 2011–2015 period and 0.5 percent per annum for the 2015–2020 period. Under these assumptions, the urbanization rate would reach only 35 percent of total population by 2015 and a modest 36 percent by 2020.

Per capita rice consumption. The analysis uses LECS 4 estimates for per capita rice consumption for 2007/08 for both urban and rural population, which is being kept constant for the 1990 to 2006 period (Chapter 2). According to the revised analysis of LECS 4 data, which was carried out by a FAO nutrition team, the average per capita consumption of rice in urban areas was 130 kg per year and in rural areas 199 kg per year during the 2007/08 period, which would give a national average consumption of rice of 179 kg per capita, based on an urban population of 31 percent of the total population. While less than the original LECS 4 estimates of about 210 kg per capita per year, it is still one of the highest levels of rice consumption in the world. Moreover, LECS 4 analysis found that the share of calories coming from rice is about 84 percent, which does not seem plausible when compared with other countries in the region, and could indicate that even this figure may be an overestimation. It should also be noted that average total caloric intake in the Lao PDR was 2 260 kcal/day in 2007/08, which is quite close to the MAF target of 2 400–2 500 kcal/day by 2015. Given the high share of total calories coming from rice, the future increase in calorie consumption is thus expected to come from food products other than rice.

There is evidence that the urban per capita rice consumption level declined substantially between 2002/03 and 2007/08, when analyzing LECS 3 and LECS 4, and rice consumption levels may have started to stabilize for rural consumption. The base case scenario would, thus, assume an average annual decline of 0.5 percent in per capita rice consumption for both the urban and rural populations over the 2011 to 2020 period. This rate of decline is significantly lower than the decline in the rural consumption level in Viet Nam during the 2000s (as well as a decline in urban rice consumption between 2002/03 and 2007/08). Under this scenario, the average per capita rice consumption would decline from 179 kg in 2007/08 to 168 kg by 2015 and further to 162 kg by 2020. This is still very high when compared with other countries in the region. Urban per capita consumption levels are expected to decline to 125 kg by 2015 and to 122 kg by 2020, while rural consumption is expected to decline to 192 kg and 187 kg, respectively, during the same time period,.

Under the high case scenario, it is assumed that urban per capita rice consumption will continue to decline at an annual rate of 0.5 percent but the average annual decline of rural per capita rice consumption will be 1 percent over the 2011 to 2020 period. Under this scenario, rural per capita rice consumption is expected to decline to 185 kg by 2015 and to 176 kg by 2020. Average national per capita rice consumption will decline to 164 kg by 2015 and to 155 kg by 2020 due to the increasing proportion of urban population to total population.

Under the low case scenario, it is assumed that both urban and rural per capita rice consumption levels will remain constant at 2007/08 levels. The national average per capita consumption of rice is expected to decline to 174 kg per year by 2015 and to 172 kg per year mainly due to changes in changes in urban population share. TABLE 12 presents the summary of simulation assumptions for demographic variables for three scenarios.

TABLE 12
Summary assumptions for demographic variables for three scenarios, 2011–2020

Scenario run	Period	Population growth %	Change in urbanization rate %	Consumption change	
				Urban %	Rural %
Low case	2011–2015	2.4	1.0	0.0	0.0
	2016–2020	2.4	0.5	0.0	0.0
Base case	2011–2015	1.9	2.0	-0.5	-0.5
	2016–2020	1.4	1.5	-0.5	-0.5
High case	2011–2015	1.9	3.0	-0.5	-1.0
	2016–2020	1.4	2.5	-0.5	-1.0

Source: Assumptions by the authors.

Key results

As per the scenarios discussed above, the resulting volume of rice paddy production in 2015 would be in the range of 3.6 to 3.8 million tonnes. It should be noted that, assumptions under all three scenarios are rather conservative, which results in a relatively narrow band of production trends.

In the base case scenario, the total production of paddy is expected to reach 3.7 million tonnes by 2015, leaving a shortfall from the government target of about 0.5 million tonnes. In this scenario, the target of 4.2 million tonnes will be reached by 2019. Total land area under rice production is expected to be just under 976 000 ha in 2015, which is slightly less than the government target of 1 040 000 ha, while average yield (both wet and dry season) is expected to increase to 3.8 tonnes per ha compared with a government target of 4 tonnes per ha.

In the base case scenario, wet season lowland paddy land area is expected to reach about 749 000 ha with a total production of about 2.83 million tonnes of paddy, which are compatible with the MAF targets of 740 000 ha and 2.9 million tonnes. The projected area of upland rice under the base case scenario (90 000 ha) is also comparable with government projections (80 000–100 000 ha), while projected production levels are somewhat lower (173 000 tonnes versus the MAF target of 180 000–200 000 tonnes) due to slightly

lower yield projections (1.91 tonnes/ha versus the MAF target of 2 tonnes/ha).

In summary, the main difference between the base case scenario and MAF targets comes from dry season irrigated lowland paddy production, which is expected to reach some 701 000 tonnes under the base case scenario compared with a MAF target of 1 032 000 tonnes. The difference comes from the projected land area under irrigation. The base case scenario assumes that only 136 000 ha of dry season paddy will be reached by 2015, up from 110 000 ha in 2012, while MAF projections are based on a target of 200 000 ha under dry season irrigation.

We estimate the national rice surplus based on model runs on variations of production and demographic parameters for the period 2011–2020. Simulations were run for nine scenarios which combine various assumptions of production and non-consumptive uses of rice with scenarios of consumptive uses of rice which are affected by expected demographic changes. These can be seen in FIGURE 38 below.

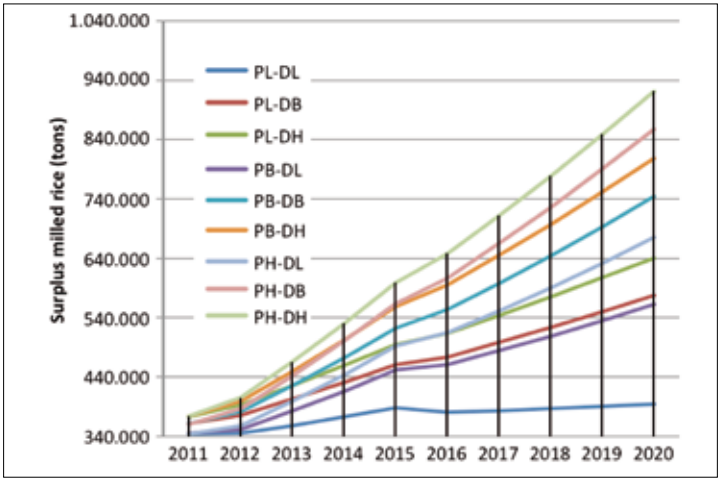
The results show that the Lao PDR would continue to build a robust level of national rice surplus even under the most conservative assumptions of changes in demographic parameters and of production/productivity growth. Under the base case production and demographic scenario, the estimate for the national rice surplus is almost 523 000 tonnes by 2015. While it is below the stated government target of 600 000 tonnes of rice exports, it is a considerable surplus by all means: it represents 23 percent of total paddy production, up from 18 percent in 2011. The whole range of national surplus estimates varies between around 388 000 tonnes (under most conservative production and demographics assumptions) and almost 600 000 tonnes (under the more optimistic assumptions). It is, thus, likely that the final outcome will be around 500 000 tonnes of national rice surplus, which is the average estimate of the three scenario runs (production and demographics base case, production low/demographics high and production high/demographics low)[50].

50 In addition to this, the analysis also shows that the national rice surplus is not highly sensitive to changes in demographic variables, especially when we simulate the impact of changing annual growth rates of per capita consumption rates and population, while keeping the annual change in urbanization constant at 2 percent for 2011–2015 and 1.5 percent for the period 2016–2020 in combination with the base case production scenario. Finally, the results show that the decline in per capita rice consumption compensates for population growth in several of the scenario runs, depending on the rate of urbanization.

The results demonstrate that the Lao PDR's exportable surplus of rice will continue to build to a robust level even when assuming modest production growth and conservative demographic change. Exportable surpluses are expected to reach 450 000–500 000 tonnes by 2015 (from the current level) under the base case production scenario, even with the conservative assumption that: i) population growth will continue at an annual rate of 2.4 percent (historical growth rate from the 1990s and early 2000s); ii) urbanization will grow at a modest annual rate of 1 percent (well below its historical trends); and per capita rice consumption, which is fixed at the 2007/08 level, will be constant (even if evidence from the LECS4 data analysis suggests declining per capita rice consumption trends). Assuming a greater annual per capita decline in rice consumption of 0.5 percent in urban areas and 1 percent in rural areas (still modest compared with historical rice consumption trends in neighbouring Thailand and Viet Nam), while keeping all other parameters fixed at baseline levels, the potential exportable surplus could reach 550 000 tonnes by 2015 and even more (when assuming faster urbanization, while keeping annual growth of paddy production at a modest 3 percent).

The rice surplus would be even larger if simulating the results until 2020. The projected rice surplus by 2020 would range between 400 000 tonnes, when using most conservative production growth and demographic change assumptions, and 920 000 tonnes under more optimistic scenarios. Using the base case scenario assumptions, it is expected that the plausible range of national rice surplus by 2020 will be between 700 000 and 800 000 tonnes, with an estimated mid-value of 745 000 tonnes (or some 1 200 000 tonnes in paddy equivalent). Given the time it takes to build a competitive milling sector or establish viable export market channels, it would be useful to start planning for the utilization of such a surplus early on.

FIGURE 38
Milled rice surpluses resulting from different scenarios, 2011–2020



Source: MAF data for 1990–2011, and estimates for 2012, and the authors' calculations.
Coding: PL – low case production scenario; PB – base case production scenario; PH – high case production scenario; DL – low case demographic scenario; DB – base case demographic scenario; and DH – high case demographic scenario.

Scenarios for Public Investment in the Rice Sector

Five public investment options to create investment scenarios have been considered. Each option in turn is used in simulations of key rice sector variables for the 2013–2015 period (essentially production and surplus). Moreover, the options can be classified under two main public investment areas: (i) extension-related investments, including the promotion of the adoption of R3 seed and improved fertilizer use by farmers, as well as a comprehensive "best practice" package; and (ii) irrigation-related investments, including rehabilitation and new construction of irrigation schemes.

The first step was to simulate the effects of each investment option on the three farmer typologies discussed in Chapter 3, as investments in irrigation or extension have different impacts according to farmer characteristics. The information used to develop the simulations scenarios has been sourced from previous studies of rice production in the Lao PDR. In the sections below, the options are first explained and their relative efficiency discussed. Then, specific public investment

scenarios are analysed, based on different investment criteria, and the results are summarized.

Options for public investment in the Lao rice sector

Five technical options have been considered for public investment. They mirror past government interventions and focus on policies based on "budgetary transfers" from taxpayers to producers; they do not include some of the broader policy options. The following is a discussion of the five key technical interventions considered.

Investment model 1 simulates the adoption rates of R3 seed by farmer types. The incremental yield increase due to the adoption of improved R3 seed is assumed to be 25 percent for Type A farmers and 20 percent for Type C farmers, and farmers are expected to rotate the seed over a three year period. Adoption rates are assumed to be higher for Type C farmers compared with Type A farmers across all simulations. The number of farmers and the related wet season area of paddy are constrained by the ability of seed stations to multiply sufficient amounts of breeder, and R1 and R2 seed and by the limitations of the R3 distribution system. The maximum incremental paddy area is limited to a seed renewal rate of 20 percent. The cost of public investments includes farmer extension support and the cost of production of breeder, R1 and R2 seed by seed stations. It is assumed that farmers cover the cost of R3 seed, which is included in gross margin calculations.

Investment model 2 simulates the incremental increase of paddy production through the introduction of improved fertilizer usage. The incremental yield increase due to improved techniques in fertilizer use is assumed to be 40 percent for Type A farmers (no prior fertilizer use), 16 percent for Type B farmers and 8 percent for Type C farmers (who already use fertilizer and, therefore, harvest higher yields). It is assumed that farmers will continue to purchase fertilizer on an annual basis after being exposed to the benefits of its improved use through extension training. The cost of public investments includes farmer extension support. It is assumed that farmers will cover the cost of fertilizer, which is included in gross margin calculations.

Investment model 3 introduces a "best practice" package. This model combines the adoption of improved R3 seed with improved techniques in fertilizer use. The best practice package provides training to producers through a combination of production activities, namely promoting increased fertilizer usage supported by the extension of

more appropriate fertilizer use along with optimal pest control, water management and post-harvest techniques. For Type B and Type C farmers, adoption of improved fertilizer usage does not necessarily mean the application of more fertilizer, but rather a more appropriate use of fertilizer, such as correct (micro) nutrient balance and timing of fertilizer levels. The incremental yield increase resulting from the adoption of best practice packages is assumed to be 40 percent for Type A farmers, 60 percent for Type B farmers and 43 percent for Type C farmers. This model should be considered as providing an upper bound estimate of the potential for productivity improvement in wet season rice paddy areas. As in model 1, the total number of farmers and wet season paddy areas are limited by the ability of seed stations to multiply breeder, R1 and R2 seed and to distribute R3 seed. The cost of public investments includes farmer extension support and the cost of the production of breeder, R1 and R2 seed by seed stations. It is assumed that farmers cover the cost of R3 seed and fertilizer, which is included in gross margin calculations.

Investment model 4 simulates investments in the rehabilitation of existing irrigation infrastructure in dry season paddy areas along with extension support and applies only to Type C farmers. The incremental yield increase resulting from the adoption of best practice packages is assumed to be 70 percent (from 4.3 to 7.3 tonnes per ha).

Finally, *investment model 5 simulates investments in the development of new irrigation infrastructure in wet season paddy areas along with extension support*. The model covers all three types of farmers. The incremental yield is assumed to increase by 230 percent for Type A farmers (from 2.1 to 6.0 tonnes ha), and by 142 percent for Type B and Type C farmers.

Geographical targeting of public investments. The investment models are anchored to the actual number of wet and dry season rice producers and size of paddy areas in the seven plains, in order to generate more realistic assumptions on target farm households and paddy areas. According to the 2010 Agriculture Census, on the seven large plains, about two-fifths of all the country's rice growers together produce two-thirds of the total paddy output of the Lao PDR, while using one-half of the total national paddy area. On the three largest plains in Savannaketh, Vientiane and Xedone provinces (mainly districts from Saravane province), one-fifth of the nation's rice farmers produce about two-fifths of the total national paddy output, while using only

one-third of the total paddy area (wet and dry seasons). The data from the 2010 Agriculture Census also shows that the seven plains have a slightly higher share of dry season paddy and also larger average wet season paddy landholdings compared with the national average (1.7 ha/household versus 1.3 ha/household). Assumptions are made on the number of farmers, adaptation/investment scale-up rate, and wet and dry season paddy area size, which were verified with rice sector experts. TABLE 13 shows that there were approximately 300 000 rice growers in 51 districts of the seven large plains, cultivating about 550 000 ha of wet season rice and 43 000 ha of dry season irrigated rice. It was assumed that 10 percent of these farmers are classified as Type A, 70 percent as Type B and 20 percent as Type C. The sheer number of producers classified as Type B producers means that a small change in production within this typology magnifies into significant productivity increases at the aggregate levels of a scenario run.

TABLE 13
Rice production statistics in the seven targeted plains, 2010

Plain	No. of growers	Wet season area (ha)	Dry season area (ha)	Average yield (tonnes/ha)	Total production (tonnes)
Attapeu plain	12 800	17 070	870	2.7	45 918
Champasack plain	49 600	88 300	4 025	3.0	267 549
Savannaketh plain	69 100	169 925	8 225	3.9	659 309
Khammuane plain	44 900	74 050	5 450	4.0	296 200
Xedone plain	48 500	86 225	6 075	3.5	303 512
Bolikhamsay plain	26 900	40 200	1 900	4.0	162 408
Vientiane plain	44 370	73 925	16 150	4.4	327 48
Total	**296 170**	**549 695**	**42 695**	**3.8**	**2 062 384**

Source: 2010–2011 Lao Agriculture Census and MAF. Brief Report on the Rice Production in the Seven Large Plains. (Unpublished).

The cost of public investments (for both government and donors) includes delivery of extension activities and seed production, and irrigation infrastructure investments. NAFES strategy recognizes the limitations of current public extension structures and sees its future

role as a facilitator and coordinator rather than direct provider of mass extension services[51]. We assume that in order to scale up extension activities, the government would need to recruit a significant number of qualified extension officers or outsource some extension activities to "third party" service providers. The extension costs should, thus, cover salaries of contracted staff, vehicles and equipment, training, operating costs, overhead costs, and costs related to the coordination functions of NAFES extension staff.

For the purposes of simulation analysis, it is assumed that the extension cost is USD 300 per farmer for investment options 1 to 3 (improved seed adoption), which cover all such costs. This is consistent with the total cost of providing extension services under the Laos Extension Approach Project (LEAP), which has been estimated at USD 308 per contacted farmer[52,53]. The cost of delivery of extension services was assumed to be USD 150 per contacted farmer for irrigation investment options 4 and 5 (the rehabilitation and new construction), due to the more focused and concentrated nature of such activities. Furthermore, it has been estimated that the cost of irrigation rehabilitation is USD 1 500 per ha, while the cost of construction of new irrigation infrastructure is USD 5 000 per ha, which is in line with international unit costs but may be on the low side when compared with data from DoI[54]. It is assumed that irrigation investment options include annual operating and maintenance costs, which would be paid through public funds.

TABLE 14 shows some of the key results and related efficiency indicators. The results are based on "best-guess" estimates on the number of participating farmers and land area size. The table

51 Over the last five years, MAF's PIP has allocated an average USD 297 000 per annum to NAFES, which provides funding for 141 NAFES staff members located centrally in Vientiane Municipality and 1 076 staff members located across the country. Assuming a ratio of 80 farmers per extension officer, the current staff would be able to reach at best 85 000 farmers across the Lao PDR (about 10 percent of all rice producers in the Lao PDR), provided that there were sufficient operating resources and other incentives.

52 Based on the delivery of extension activities to 15 380 farmers at a cost of USD 4 749 255.

53 These estimates are consistent with experiences of neighbouring countries. For example, the average cost of extension services per contacted farmer was USD 273 over the 2004–2009 period (including both government and donor spending) in Cambodia, which has to some extent a similar extension system to that of the Lao PDR. World Bank. Cambodia. Agriculture, Irrigation, and Rural Roads Sectors Public Expenditure Review (World Bank, 2012a).

54 DoI estimates that the cost of developing a new irrigation infrastructure is in the magnitude of USD 10 000 and higher.

shows estimated incremental production increases above the base case scenario (3.7 million paddy by 2015) and also the related public investment costs over the 2013–2015 period. Finally, it also presents indicators of efficiency for each investment option. The models should be viewed as independent from one another – no constraints were imposed on the aggregate number of farmers and paddy area size.

TABLE 14
Key results and related efficiency indicators of five main investment options

	2013–2015				Efficiency indicators		
Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)	Paddy kg/ha	Paddy kg/HH	Paddy/ spending (kg/USD)
1. Three-year rotation of R3 seed	124 865	216 133	139 824	38 020 766	647	1 120	3.7
2. Improved fertilizer usage	166 211	286 420	125 433	49 863 181	438	755	2.5
3. Best practice package	125 961	214 951	408 919	38 348 951	1 902	3 246	10.7
4. Irrigation scheme rehabilitation	29 000	20 300	178 133	87 000 000	3 233	6 399	2.0
5. New irrigation scheme	31 246	53 817	230 758	273 772 144	4 288	7 385	0.8

Source: The authors' calculations.

Of the three extension models, the best practice package delivers the largest incremental volume of paddy production above the base case scenario discussed above. It will target 42 percent of wet season rice producers in the seven plains. It also has the highest efficiency for public spending in terms of incremental paddy produced per dollar of public spending. Investment options on R3 seed and fertilizer usage illustrate outcomes of more narrowly focused extension activities. However, the more common and acceptable approach used by NAFES is to combine several technical packages into a more comprehensive extension advisory package (i.e. best practice package).

Development of new irrigation infrastructure provides the highest volume of paddy per ha, due to improved yields and double cropping, but its contribution to aggregate national paddy production is modest and it has the highest cost for public investments. It will, therefore, deliver the lowest ratio of incremental paddy per dollar of public spending. It will also benefit a relatively small percentage of wet season rice farmers in the seven plains (about 10 percent). The irrigation rehabilitation option is restricted to about half of the existing irrigated dry season paddy area in the seven plains of around 42 700 ha. This would also limit its potential to contribute to increasing paddy production.

The above simulations show that there is a wide range of investment costs associated with the various investment options and associated returns on investments. While simulations show that investments in best practice technology adoption packages (for wet season lowland paddy areas) may be the most efficient way of achieving targets, a prudent investment policy would also need to involve rehabilitation of existing irrigation infrastructure (to maintain the current capital stock), and/or expand areas under new irrigation infrastructure. The latter would have the highest impact on farmers' gross margins and returns on labor, and thus on creating incentives to respond to government policies.

Specific public investment scenarios

We will narrow the subsequent simulation analysis to two specific policy scenarios. First, the above analysis indicates that government may be able to achieve its production target of 4.2 million tonnes of paddy by focusing its public spending on about 200 000 ha of "core area", which would be about one-third of the wet season paddy area in the seven plains. The largest incremental gains could be achieved by focusing on Type B farmers in lowland wet season areas, which is the largest segment of rice growers in the seven plains with the highest incremental production potential. We simulate various combinations of public investment options around this target area, without restricting the amount of public spending available for such investments. Second, we run simulation scenarios by setting public spending limits on public investments over 2013–2015. To simply the analysis, we reduce the combination of investments to three options: (i) best practice extension packages; (ii) rehabilitation of existing irrigation infrastructure; and (iii) construction of new irrigation infrastructure.

TABLE 15 to TABLE 17 present the results of the simulation analysis that centers around the target "core area" of 200 000 ha. The "balanced" scenario (TABLE 15) aims to balance best practice extension activities

with investments in irrigation infrastructure. Under this scenario, which would require the targeting of about 115 000 farmers, the incremental production of paddy would be about 484 392 tonnes over 2013–2015, which comes close to the target of 500 000 tonnes. The total investment cost under this scenario is USD 211 million.

TABLE 15
A "balanced" investment package, 2013–2015

Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)
Best practice package	87 756	150 000	286 856	26 800 004
Irrigation scheme rehabilitation	10 526	20 000	64 657	31 578 427
New Irrigation scheme construction	17 619	30 000	132 879	152 644 846
Total	**115 901**	**200 000**	**484 392**	**211 023 277**

Source: The author's calculations.

TABLE 16
An "extension focused" investment package, 2013–2015

Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)
Best practice package	99 468	170 000	325 693	30 371 667
Irrigation scheme rehabilitation	5 263	10 000	32 328	15 789 214
New irrigation scheme construction	11 748	20 000	89 569	101 764 545
Total	**116 479**	**200 000**	**447 590**	**147 925 425**

Source: The authors' calculations.

TABLE 17
An "irrigation focused' investment package, 2013–2015

Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)
Best practice package	81 551	140 000	270 440	24 904 148
Irrigation scheme rehabilitation	10 526	20 000	64 657	31 578 427
New irrigation scheme construction	23 132	40 000	170 140	203 470 542
Total	**115 210**	**200 000**	**505 237**	**259 953 117**

Source: The authors' calculations.

The simulation results in TABLE 16 aim to minimize the public spending cost by biasing the investment options towards extension activities. Under this scenario, the incremental paddy production would be 447 590 tonnes but total required public investment would be USD 148 million.

Finally, TABLE 17 presents a public investment spending mix which is more biased towards irrigation infrastructure. Under this scenario, the incremental production of paddy in core areas would exceed 500,000 tonnes of paddy, which would achieve the government target of 4.2 million tonnes of paddy by 2015. However, the total investment cost under this option increases to a whopping USD 260 million over the 2013–2015 period.

The analysis shows that the incremental production of paddy increases with the share of investments in irrigation rehabilitation and construction of new irrigation infrastructure, but it comes with increasing public funding requirements, which may be beyond the reach of what is possible within current PIP or projected donor-funding commitments.

In order to incorporate the funding issue, we restrict the total public spending available for investments by both government and donor sources. We use the MAF AIP for the five-year period 2011 to 2015 as guidance on the levels of public spending. The AIP is based on the ADS 2011–2020 and on the AMP 2011–2015. It calls for the development partners and the private sector to enter into partnerships to finance the implementation of eight programmes in the various regions of the country. The AIP simulates three investment scenarios for the

2011–2015 period, which are termed (1) realistic, (2) conservative and (3) optimistic.

We will base our resource requirement estimates largely on scenario 2 (conservative) estimates which assumes that the main source of funding comes from the Government of the Lao PDR and development partners, with no significant funding from the private sector. The eight programmes were analysed to identify those investment measures that come closest to supporting rice production in the seven plains[55]. These investment measures include support for rice production through extension and research, seed production, and investments in irrigation rehabilitation and construction of new irrigation infrastructure. The total investment cost of these programmes is estimated at USD 100 million until 2015, with 90 percent of this funding expected to come from donors. Some 30 percent of this funding is earmarked for rice production support through extension, research and seed production, with the remaining 70 percent is earmarked for irrigation development. TABLE 18 to TABLE 20 present the results of the three scenario runs against various combinations of investment options within a USD 100 million ceiling, while maintaining a 30/70 percent ratio for extension/irrigation investments.

TABLE 18
A "balanced" investment package with a public investment ceiling, 2013–2015

Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)
Best practice package	98 250	167 795	319 841	30 000 000
Irrigation scheme rehabilitation	10 000	19 000	61 424	30 000 000
New Irrigation scheme construction	4 616	7 862	34 263	40 000 000
Total	**112 866**	**194 657**	**415 528**	**100 000 000**

Source: The authors' calculations.

55 The selected investment measures include the following proposed activities, as per their reference numbers in the MAF AIP: 1.3; 1.8; 1.10; 1.14; 1.20; 1.21; 1.28; 2.8; 2.36; 2.42; 2.49; 2.66; 3.5; 5.4; 5.5; 5.6; 5.2; and 7.70.

TABLE 19
An "extension focused" investment package with a public investment ceiling, 2013–2015

Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)
Best practice package	98 250	167 795	319 841	30 000 000
Irrigation scheme rehabilitation	23 334	44 334	143 327	70 000 000
New Irrigation scheme construction	–	–	–	–
Total	**121 584**	**212 129**	**463 168**	**100 000 000**

Source: The authors' calculations.

TABLE 20
An "irrigation focused" investment package with a public investment ceiling, 2013–2015

Investment model	No. of HHs	Area (ha)	Incremental production (tonnes)	Public investments (USD)
Best practice package	98 250	167 795	319 841	30 000 000
Irrigation scheme rehabilitation	–	–	–	–
New Irrigation scheme construction	8 081	13 757	61 798	70 000 000
Total	**106 332**	**181 553**	**381 639**	**100 000 000**

Source: The authors' calculations.

The simulation runs shows that 200 000 ha of target core area is feasible even when investments are capped at USD 100 million, which further confirms the validity of our assumptions for spatial targeting of scarce public resources. The incremental paddy production ranges from around 382 000 tonnes with just new irrigation investments to 463 000 tonnes when all irrigation funds are allocated only to rehabilitation. This scenario, however, is not realistic as it assumes that more dry season paddy irrigated area would be rehabilitated than is currently available in the seven plains.

TABLE 18 presents probably the most realistic scenario for public investments in the seven plains area, balancing investments in extension activities with a combined allocation of irrigation funding for both rehabilitation and construction of new irrigation infrastructure.

Under this scenario, the incremental production of paddy would be 415 528 tonnes by 2015 and reach around 113 000 rice producers. The total production of paddy under this scenario would be 4.12 million tonnes by 2015. While it falls slightly short of the government target of 4.2 million tonnes, it is enough to generate 745 000 tonnes of milled rice surplus, potentially available for exports, by 2015.

The simulation runs show that while irrigation investments are an important component of a public investment package, the highest incremental production volumes and returns on public spending come from best practice extension packages, which contributes between 60 and 80 percent of total incremental paddy production, depending on scenario runs. The key component to this investment package is the availability of good quality R3 seed, along with functioning extension and access to fertilizer. However, the rice seed sector in the Lao PDR faces significant challenges, as discussed in Chapter 3. Addressing these challenges requires allocation of dedicated government funding for seed multiplication, as well as necessary institutional reforms that improve the efficiency of seed production systems at all levels and encourage establishment of a viable private sector-driven seed distribution system. Annex 5 provides an in-depth analysis of issues facing the rice seed sector in the Lao PDR and possible policy, including regulatory and investment actions that are required to establish a functioning seed system.

6. Conclusions and Recommendations

The results of this study seem to confirm the continuing structural transformation of the Lao rice sector which started a decade ago. To some extent, the sector transformation is being led by inter-related factors not strictly related to government rice sector policies, including: (i) continued GDP growth led by mineral and hydropower exports; (ii) increasing job opportunities in the non-tradables, non-agricultural sectors, associated with increasing incomes; (iii) increasing urbanization with consequences for rural wages[56] and consumption patterns; and (iv) stabilization of aggregate national rice consumption as a result of a declining population growth rate and the gradual diversification of diets away from rice as a source of calories.

These changes are to some extent irreversible and will take place to a large extent independently of government policies in the rice sector. They are expected to contribute towards an increasing rice surplus, which could potentially mean more opportunities for rice exports and increased farmer incomes. Trade (both formal and informal) has an important role to play in creating conditions for improved efficiency and profitability of the modern value chains which serve Lao rice producers and agribusinesses.

Then there are trends that can be influenced positively through appropriate policies and public intervention. These trends include an ongoing and gradual shift from rice cultivation towards more mechanized cultivation of commercial cash crops, in the search for higher farm incomes and in response to labour shortages. They are also expected to lead to further concentration of rice production in high potential areas in the Mekong plains through farm consolidation and cropping intensification, in the search for higher returns on labour

56 Regarding a farm labour shortage, this is the result of two main trends: (a) demographic changes caused by a declining population growth rate (reducing the absolute number of new entrants into the labour market and increasing the relative size of the aged population, including aging farmers); and (b) the exodus of the young in the workforce from the agricultural sector in search of higher income-earning opportunities in the non-farm sector in the Lao PDR, but also in Thailand. These trends are not specific to agriculture. Similar labour constraints emerge in the manufacturing sector. The recent World Bank Investment Climate Assessment (World Bank, 2011b) provides evidence that Lao export competitiveness is being eroded by the rapid growth of real wages driven by the over-stimulated domestic construction and service sectors.

(versus returns on land). Rice production will probably continue to decline in upland areas and in the northern provinces, which are already largely considered rice (but not necessarily food) deficit areas, regardless of efforts to reverse this trend, as households switch increasingly to other more profitable or diversified livelihood activities. This means that rice deficits in such areas will continue to increase in light of stagnating production levels and increasing population numbers, despite an increasing rice surplus at the national level. This surplus, however, does not necessarily translate to improved nutritional outcomes due to still limited knowledge about nutrition and to limited dietary diversity.

As the Lao rice sector has moved from deficit to surplus production and is going through a profound transformation at both the consumption and production levels, the current policy mix may no longer be optimal for achieving the key government objectives of food security and economic growth. There are several opportunities for improving current policies through more coordinated actions regarding rice sector support policies and more efficient resource allocation in the case of budget transfers to rice producers. We will discuss them in turn.

The Lao Rice Sector in a Period of Profound Transformation

At a macro level, this transformation is essentially the result of increasing per capita incomes and with this, growth in urbanization and a slow down in population growth. As incomes increase, diet patterns shift away from rice as households diversify their diets. According to the analysis of LECS data, per capita rice consumption has probably already peaked.

Food security, strictly measured as access to rice, is no longer a major problem in an aggregate (national) sense, but rather a localized problem mainly in upland areas. Moreover, while the Lao PDR is vulnerable to extreme climatic events, the analysis shows that rice production expansion and the localized nature of most events, means that even with floods and droughts, the Lao PDR is able to produce enough rice for its needs at a national level, as well as a rice surplus that can be exported. The corollary is that food security support programmes related to rice availability only need to target specific groups and locations and need to build in disaster preparedness elements to help respond to extreme climatic events.

Improving nutritional outcomes will increasingly be dependent on policies that promote higher household incomes, focus on better use of foodstuffs and are able to tackle specific constraints of particular population groups in the Lao society, namely food (rice) deficit groups in remote rural locations and the poorer and more vulnerable segments of the urban population, whose share of food (rice) expenditure to total expenditure is relatively high. Rice production and surpluses are not a sufficient condition for attaining good nutritional outcomes. This is consistent with observations of poor dietary diversity in high-surplus provinces in the Lao PDR and also with evidence on high malnutrition rates in some of the highest surplus-producing regions in the world, such as Viet Nam's Mekong River Delta.

The results from analysis of the farm models suggest that low input/low output rice-farming households are not able to obtain sufficiently high incomes (or returns on labour), thereby limiting their incentives to respond to planned government investments in the rice sector and to its policy goals in general. There is evidence of a gradual shift away from the farming of rice to the farming of other crops or to non-farm employment. Recently released data from the 2010–2011 Lao Agriculture Census support this observation. They show how the percentage of households growing rice has decreased from 77 percent of all farming households in 1998/99 to 71 percent in 2010/11. Rice production is becoming increasingly concentrated in regions with a natural comparative advantage, such as in the seven plains where it can still generate fairly decent returns at more appropriate price levels, but especially through multicropping when irrigation is available.

The Current Policy Mix May No Longer be Optimal for Achieving Key Government Objectives

The policy review presented in this study shows that although rice has always been a key focus of government policies the country does not have a comprehensive rice policy that cuts across different government institutions. The present situation is characterized by numerous policies stemming from different government sectors, with sometimes conflicting policy and political objectives. While there is not one policy, the resulting policy mix plays a crucial role in determining incentives for the different rice value chain agents (from producers to millers and exporters).

Current policies by the Government of the Lao PDR include both elements that do not require budget transfers (mainly trade related,

for example, through discretionary export bans) and elements that require budget allocations. The latter includes transfers that directly benefit individual farmers and include: (i) payments based on variable input use (seed, irrigation operation subsidies – mainly electricity and subsidized credit); (ii) fixed capital formation (irrigation development); and (iii) on-farm services (extension), as well as transfers benefiting agricultural producers collectively (such as research in rice seed, rice nutrient management).

The analysis conducted in Chapter 4 indicates that among those policies focusing on direct budget transfers, the total resulting value of transfers to rice producers stood at around Kip 74 billion (around USD 9.3 million) in 2010/11. In addition, it shows that transfers are made to a concentrated, reduced number of farmers, as they are essentially driven by: (i) irrigation-related expenditures through electricity subsidies and irrigation construction and rehabilitation; and (ii) subsidized credit rather than extension support and training. Furthermore, these transfers are largely insignificant relative to implicit transfers through policies that affect prices received by farmers, which arise mainly as a result of policies affecting the gap between reference and producer prices.

Our analysis shows that current trade policies, namely discretionary export bans imposed at central and provincial levels that affect prices, result in high transfers from producers to consumers. The value of these transfers is almost thirty-six times the value of the positive budget transfers. Including transfers from taxpayers to producers through MPS, total MPS results in a Kip 3 141 billion transfer from producers to consumers and taxpayers versus around Kip 74 billion in positive budget transfers to producers. This has been the case in five of the six years which were analysed. While there is still room to improve the efficiency of public spending, policies that affect price differentials are much more important in explaining overall support for Lao rice producers. It is, therefore, likely that efficiency and effectiveness of public spending on agriculture (as well as spending from donor sources) is undermined by current trade policies.

The negative effect of current trade policies is due to two factors. First, there is a significant gap between farmer and reference prices, even when conservative processing, transportation and handling margins are used. Second, there is significant informal rice trade with neighbouring countries and this translates to price integration in the region. As well as not being fully efficient in stopping the informal

trade, discretionary trade bans and other measures result either in excessive costs to cross the border (through informal payments) or in higher risks associated with exporting, which in turn results in inefficient marketing and implicit taxation of producers.

Apart from the reduced efficiency of public spending, the analysis shows that the current policy mix does not support the government's policy alleviation objectives as it is not favouring farmers, who comprise the poorest segment of the population, thus contradicting its poverty reduction goals. Moreover, it is not supporting the country's export sector, namely labour intensive exports such as rice. In fact, even considering conservative estimates, informal rice and paddy exports would amount to around USD 30 million annually, which is quite a considerable sum for the Lao PDR, given that only the labour intensive sectors are considered.

The analysis conducted in the study indicates that in the absence of major policy changes, the Lao PDR will be producing a growing rice surplus in the coming years, even assuming modest productivity growth and conservative demographic change. The exportable surplus is expected to reach 450 000 to 500 000 tonnes by 2015 (from the current 300 000 tonnes) under the base case production scenario, even with conservative assumptions on population growth and urbanization. Assuming slightly more optimistic parameters, the exportable surplus could reach 550 000 tonnes or higher by 2015.

Moreover, under a base case scenario, the total production of paddy is expected to reach 3.7 million tonnes by 2015, short of the government target by about 0.5 million tonnes. In this scenario, the MAF target of 4.2 million tonnes would be reached by 2019. Total land under rice production is expected to be just slightly below the government target of 1 040 000 ha, while average yield (both wet and dry season) is expected to increase to 3.8 tonnes per ha compared with the MAF target of 4 tonnes per ha. While the size and productivity of the wet season lowland and paddy land area are expected to be compatible with the MAF targets of 740 000 ha and 2.9 tonnes, the major shortfall comes from dry season irrigated lowland paddy production, which is expected to reach some 700 000 tonnes compared with the MAF target of 1 032 000 tonnes. The gap between the base case scenario and MAF targets is due to the projected land area under irrigation, which is expected to be significantly below MAF's projection of 200 000 ha for 2015.

Options for Improving Rice Sector Policies

Eliminate Export Bans

It is realistic to think that the Lao PDR can consolidate its position as a rice exporter, albeit a small one in the international context. This is mainly because of competitive paddy production costs and potentially interesting markets for glutinous rice in Viet Nam, Thailand and even China. As discussed, the Lao PDR is probably already exporting a significant amount of rice and paddy to neighbouring countries, despite wide margins between producer and reference prices.

The key question is how can this be done with a set of policies that also promotes food security. This study suggests several specific improvements to the current policy mix. It is argued that *if trade policy is used, a variable export tax is more efficient than an export ban*. This is essentially because one of the key costs of trade restrictions is that they often create risks for traders who engage with one another through longer-term trade agreements. These higher risks make it more difficult for traders to stay in business, which means that marketing margins get wider while their credibility as reliable suppliers is lost. In turn, wider margins mean lower prices for producers and higher prices for consumers. Most importantly, in order to avoid unnecessary risks, it is important that any trade restrictions be predictable and allow the private sector some flexibility. The present form of discretionary export bans and unstable trade relationships do not meet these conditions. In fact, trade restrictions are applied with little, if any, advance notice at both central and provincial levels, and a ban, furthermore, does not permit any trade whatsoever. These conditions make it difficult for the private sector to carry out trade efficiently, and this will affect Lao PDR's ability to handle a recurring rice surplus that needs to be exported.

While abolishing export bans is clearly the best policy option, it may not be politically feasible in the short-term. The second best policy recommendation is to create a transparent trade (export) environment for both rice and paddy, with clear and easily monitored rules at the border. Such a policy *might* include substituting all bans at central and provincial levels with a WTO-consistent indexed variable export tax. Although clearly a second best solution, a WTO-consistent export tax would bring many benefits compared with discretionary waivers imposed by officials, namely: (i) predictability, which is an essential condition for private sector development; (ii) reasonable protection for milling (this refers mainly to eliminating full bans on

paddy exports); and (iii) tax revenue (such export tax value could be used to support targeted food security/safety-net type programmes in those areas where there are issues about rice access). It is suggested that the government consider implementation of this option only after completion of the WTO accession negotiations. If considered as a feasible policy option, such a measure would need to meet international standards of reasonableness, transparency and non-discriminatory application.

It is also critical to establish a prudent trade policy coordination mechanism between MoIC and MAF at the central and provincial levels that would avoid undermining rice sector policies which are being implemented by MAF. The trade policy discussions should be based on improved information about production, consumption and trade flows. The details of such coordination arrangements need to be worked out but ideally they should include mechanisms that would require MAF's consent on proposed trade and price policy decisions.

Allow formal or informal exports of paddy

The Lao PDR is bordering on two of the largest rice exporting countries in the world, Thailand and Viet Nam. Both of these nations are also significant producers and exporters of glutinous rice. They also have highly competitive milling and transport infrastructures. The main constraint for export of Lao milled rice in the short and medium term will be the high cost of milled rice relative to its quality. While the Lao PDR still has cheaper paddy production costs than its competitors, Thailand and Viet Nam, its prices for rice become increasingly uncompetitive as the rice is priced ex-rice mill, and is delivered to the regional markets or overseas destinations. Lao milled rice suffers mainly from low milling quality, which makes it unattractive to consumers in neighbouring countries. These same issues will also affect the potential exports of non-glutinous rice. However, there is interest by Thai and Vietnamese traders and millers to import cheaper Lao glutinous paddy, which could be milled in their countries and sold to domestic or international markets (and in some cases back to the Lao PDR, whose consumers may prefer higher-grade milled rice from Thailand to lower-grade locally milled rice).

While investments in milling capacity in the Lao PDR have been increasing over the past years, a vast majority of commercial mills are still small and operate with obsolete milling equipment. Overcoming milling constraints would require significant private sector investments (from domestic or foreign sources) in large modern mills and polishing

factories. Experiences from neighbouring emerging rice-exporting countries, such as Cambodia, show that such changes in the milling sector will happen once the country starts to produce a sizable surplus of paddy, which could be potentially turned into milled rice exports, in addition to setting a clear policy vision which is endorsed at the highest levels. The experience of Cambodia also shows that allowing formal and informal export of paddy has not been mutually exclusive with the development of a competitive milling sector. In fact, allowing trade has been a key incentive for encouraging farmers to increase production of paddy while improving its quality in order to meet international demand, which has also been the main driver for new investments in the Cambodian milling sector. Furthermore, due to the informal and unrestricted export of paddy, Cambodian farmers have indirectly enjoyed paddy support prices from neighbouring countries, which has more than compensated for years of public sector spending on agriculture. Finally, evidence from Cambodia shows that allowing informal paddy exports has not depleted the country's supplies of rice nor has it led to significant volatility of domestic prices (apart from the 2008/09 price hike) (see Boxes 2 to 4 for discussion on rice policies in Cambodia, Viet Nam and Thailand)[57].

Establish efficient emergency rice seed and food reserves

As part of the current food security-related policies, the Government of the Lao PDR has also established a pilot national rice reserve programme. The analysis in this study indicates that buffer stocks will be effective for only a short period of time at best, given the Lao PDR's integration with larger regional rice markets. Further, their effectiveness is contingent upon closure of the border/trade restrictions that has proven difficult to enforce in practice. Thus, the current Lao policy of having limited buffer stocks seems reasonable although it may not be able to achieve its intended objectives in reality. Focusing on strengthening the other two pillars of its reserve programme, emergency rice seed and paddy reserves for that part of the population affected by natural disasters and targeted food aid/ safety net programmes for vulnerable groups, may be a better way of achieving its political objectives. The vulnerable groups include chronically food deficit people in remote rural areas and poor and

57 It should be noted that the scale of the Lao rice production system is not significantly different from that of Cambodia, although it is sometimes perceived as different. Both countries depend heavily on wet season rice for paddy production (about three-quarters of total paddy production). While total area of wet season paddy in Cambodia is about 2.4 million ha compared with 0.96 million ha in the Lao PDR, the per capita availability of wet season paddy area is similar in both countries – 0.17 ha in Cambodia compared with 0.15 ha in the Lao PDR.

vulnerable urban populations whose expenditure on food represents a large share of their total spending. Our preliminary estimates suggest that a reserve of 30 000 to 60 000 tonnes may be sufficient to meet the food security needs of such groups. It is suggested that government consider complementing physical rice stocks with cash transfers to those groups which would be most negatively affected by rising rice prices, such as the urban poor. Such cash transfers could be managed as part of a safety net system which is being developed by the government.

However, there is a need to clarify policy objectives and targets of such programmes and to develop clear operating guidelines, especially for reserve programmes, to ensure their cost efficiency. Whether government chooses to use physical reserves or cash transfers (or a combination of both), there is a need for the development of clear operational guidelines for such programmes, and associated triggers, targeting and distribution mechanisms, which is beyond the scope of this study.

BOX 2

Cambodia's rice policy: from less intervention to more paddy

In the 1960s, Cambodia was a major rice-exporting country. Two decades of civil war resulted in a drastic decline in rice production and the country become dependent on rice imports to meet its consumption needs. Cambodia regained its rice self-sufficiency in 1995, and in 1996 started to export paddy informally to Viet Nam. In 1996, the government banned informal paddy exports on the grounds that food was in short supply, especially during the period just before the new harvest. The ban was subsequently lifted in 2000. However, later in 2000 Cambodia was hit by the worst floods of the 2000s, which led to rice shortages. Exports of paddy certainly contributed to the shortage. The country imported rice from Viet Nam to cover the shortfall. However, this did not lead to a significant increase in domestic retail prices because milling costs of rice were lower in Viet Nam than Cambodia.

The rice shortfall in 2000 did not deter the government from allowing exportation of paddy to continue. Since then, the country has seen an explosion in paddy production, which reached about 8.7 million tonnes by 2011/12. Average annual growth of paddy production was 6 percent between 2001 and 2011, despite low levels of public spending on agriculture (Cambodia spends the lowest portion of GDP on agriculture of any country in the region). Growth has been driven by area expansion, but even more so through improved productivity as farmers responded to export opportunities by adopting higher yielding improved seed varieties. As a result, the paddy surplus increased almost every year since 2001, reaching nearly 4 million tonnes by 2011/12.

The primary motivation of the government in allowing informal paddy exports, while it was still vulnerable to external shocks, was a recognition of the limited capacity of the milling sector to absorb the domestic paddy surplus. Cambodia's rice milling sector is dominated by small mills with outdated processing equipment and limited storage capacity. The quality of Cambodian milled rice is on average lower than that in neighbouring countries, while milling costs are higher. While Cambodian paddy prices are normally more competitive than those of neighbouring countries, this advantage is lost at the milling stage due to expensive electricity and fuel, transportation costs and low milling efficiency. Allowing informal exports of paddy thus benefited Cambodian farmers indirectly through price support and the markets provided by neighbouring countries.

By the late 2000s, informal exports of paddy reached about 2 million tonnes per year. The 2007/08 economic crises, with a decline in textile exports and tourism, and the 2008/09 food price crisis raised the government's awareness on the potential of rice exports as an alternative source of growth, export revenues and taxes. In 2010, the government approved the policy on the promotion of paddy production and exports.

The key policy goal is to export 1 million tonnes of milled rice by 2015. The policy identifies three levels of action and investment, including short- (quick wins) medium- and long-term measures, and covers a wide range of issues from institutional development, a regulatory and legal framework, and trade facilitation for specific investments. The policy is based on a two-pronged strategy: (i) revert informal paddy exports to formal rice exports (without banning paddy exports); and (ii) enhance competitiveness along the value chain.

By 2011, Cambodia rice exports reached almost 200 000 tonnes, up from 50 000 tonnes the year before. Most of this rice went to the European Union and the Russian Federation, which provided Cambodian rice duty-free access to their markets. However, the future growth of exports will depend on new investments in modern milling capacity and on solving infrastructure and logistical bottlenecks. In 2011, there were only 12 large rice mills in Cambodia with more than 10 tonnes/hour of milling capacity, plus 4 rice-polishing plants with capacity ranging from 10 to 30 tonnes/hour. Assuming that these mills operate 12 hours per day, six days per week, they would be able to process a total of 380 000 tonnes per year or about 590 000 tonnes of paddy: this is about 25 percent of the total available paddy surplus. It would take a single exporter with 10 tonnes/hour of milling capacity about two months to assemble the necessary cargo to load a small vessel with 5 000 tonnes. This would limit the ability of the country to meet large export orders that are needed to penetrate regional markets (the Philippines and Indonesia). Cambodia is only now starting to see major foreign and domestic investments in large-scale modern mills. Having a coherent rice export policy, which was endorsed at the highest level, has certainly played a significant role in this development. But even more important were two other factors. First, Cambodia has started to generate the level of domestic surplus which gives investors confidence that it would be able to source required quantities of paddy even during years of natural calamities. Second, by committing to paddy and rice exports, the government has given investors confidence that it can get its produce out of the country even during times of increased domestic price volatility.

BOX 3

Viet Nam's rice policy: from "success" to sustainable prosperity

Over the last 25 years, Viet Nam has been remarkably successful in expanding national rice production. Viet Nam is now among the leading developing countries in terms of food calorie production per capita and food exports. This has radically changed the scope and dimensions of Viet Nam's food security challenge. On an aggregate national level, the country is highly food secure, although there remain many pockets of chronic household or community food insecurity due to poverty and livelihood vulnerability. In the broader picture, the country's food problems now relate more to child malnutrition, dietary imbalance, food safety, and staple food affordability. Indeed, Resolution 63 (2009) embraced a much broader concept of food security than the traditional focus on rice supply. Addressing this broader set of challenges calls for a multisectoral approach – going beyond rice production – to include nutrition education, social protection measures, clean water supply, food fortification and diversified livelihoods support.

Under realistic assumptions for population growth, per capita rice consumption, productivity change, climate change, and land availability, Viet Nam will likely maintain a very large (exportable) surplus in rice over the next two decades. A major reason for this is that national rice consumption has already peaked (some three to five years ago) and is now declining. Rising incomes and demographic changes are leading to dietary shifts, with incremental food expenditures concentrating on higher-value fish, meat, fruits and vegetables, dairy products, and other prepared foods. Over the next two decades, it is expected that per capita rice consumption in Viet Nam will fall from 135 kg/year to 100 kg/year or less, following patterns previously observed in other advancing countries of East Asia. This presents the country with an historical opportunity — to simultaneously meet its food security needs, improve diets and nutritional outcomes, and substantially raise rural incomes through more flexible land-use planning and related agricultural policies to promote an increasingly diversified agriculture and rural economy.

In pursuit of farmer prosperity, there is an opportunity to 'move the goal posts' (i.e. objectives) for Vietnamese agriculture and adjust the foci of government support to the sector. Past gains in rice productivity and national output contributed to Viet Nam's enormous progress from the late 1980s through to the mid-2000s in reducing the rate of poverty and eradicating hunger.

Yet, more recently, the role of rice as an engine for growth and poverty reduction has run out of gas. Rising production costs have outpaced changes in producer paddy prices, while communities have also experienced the environmental costs of intensified production. Farm households with very small landholdings can no longer improve their living standard by making productivity gains in rice monocropping. Such households are increasingly reliant on non-rice, including off-farm sources of income and employment. Only farmers with larger landholdings and based in locations with highly favorable agro-ecological conditions have been able to advance, based primarily upon specialized rice production. Indeed, most of the recent growth in rice surplus production has been concentrated among a segment of relatively larger and better off growers in two dozen districts in the Mekong Delta. These developments point to a need for a more differentiated set of strategies. In 'core rice-growing areas', implement a Rice Competitiveness and Sustainability Programme, involving more environmentally sustainable practices, farmer-agribusiness partnerships and intensified collaboration among the '4 houses' (refers in the Vietnamese context to the state, farmers, research and entreprises). In non-core rice-growing areas, emphasize diversified land use and rural economic development.

Hence, targets to produce more and more rice are no longer needed. Viet Nam already has a large surplus which it may find increasingly difficult to sell on world markets. A better balanced and managed land and agricultural policy could result in improved nutritional outcomes, a more flexible and resilient agriculture and a more diversified rural economy. Instead of simply producing more rice, Viet Nam needs to modernize its rice sector and, in some locations, to free up resources, including land, water, labour, and public budgetary resources, for even more valuable uses. For the more commercialized segments of the sector, a focused programme to spread sustainable rice production practices, improve product quality and strengthen farmer-agribusiness linkages would yield increased farmer income, improved consumer welfare and better long-term international competitiveness. Elsewhere, rice is expected to retain its socio-cultural importance and remain widely grown, yet government should focus on supporting more diversified land uses, rural livelihoods and food consumption patterns.

BOX 4
Thailand's rice policy: rice mortgage scheme

In Thailand, the main rice policy instrument has been the Rice Mortgage Scheme, in addition to public investments in rural infrastructure, agricultural research and education. The original goal of the Rice Mortgage Scheme was to allow farmers to better time rice sales and thus increase their income. Because many farmers are liquidity constrained and/or have limited storage facilities, they tend to sell their paddy during the harvest season. With many farmers coming to market at the same time, prices become depressed. To address this problem, starting in 1981 the Thai government introduced a scheme under which farmers could take low-interest loans from the Bank for Agriculture and Agricultural Cooperatives (BAAC) to allow them to delay the sale of the paddy, which in the meantime is used as collateral for the loan. The collateral is valued at government-set 'pledging prices' that were originally intended to approximate market prices. Farmers who do not have their own warehouses participate in this programme through the Commerce Ministry's Public Warehouse Organization (PWO), which operates through regional rice mills. Farmers store paddy with rice millers who participate in this programme and collect warehouse receipts from the millers. Farmers then use the receipts to obtain loans directly from BAAC. For most of the history of this scheme, pledging prices were set below domestic market prices and/or loans were over-collateralized, and, therefore, farmers generally sold the paddy to private mills and repaid the loans (which also limited the costs of the programme). There is some evidence that farmers benefited from the programme by the improved ability to time paddy sales according to market conditions.

Over time, the programme was transformed into a price support scheme. Since 2001, the government increased direct purchases of paddy from farmers and increased pledging prices, which reached about 25 to 30 percent above market prices. As a result, it became advantageous for farmers to default on the loans and leave the collateral with the government. The government then had not only to compensate BAAC for the losses but also to store and sell the collateral. The costs of the programme became substantive: between 2001 and 2006, government bought on average about 20–25 percent of wet season rice production and about one-third of dry season rice production. In the 2005/2006 growing season alone, the government was left with 3.8 million tonnes of paddy.

In September 2011, Thailand's National Rice Policy Committee made further changes in the Rice Mortgage Scheme. It raised the pledging price to THB 15 000 per tonne of paddy for white rice and THB 20 000 per tonne of paddy for Jasmine rice. These intervention prices are now 50–60 percent above market prices. Not only does this depart from previous rice-buying schemes because of the high price, but it also fails to set any limit on government purchases. If anyone is prepared to sell, the government is duty-bound to buy. The policy has made the government the world's largest rice trader, dealing with virtually the entire marketable surplus of rice in the country.

The result is a scheme that, although requiring billions of dollars, fails to perform in any economic or financial sense. Contrary to, say, an outright purchasing programme by a government marketing company, there is no proper check on whether paddy is really delivered to the warehouses, or whether it meets certain minimum quality standards. The result is massive collusion between millers and farmers to misrepresent deposits. Furthermore, as farmers do not expect that they will ever take their paddy back once delivered to the warehouse, little care is given to actual storage conditions, leading to unnecessary waste. While the Thai government presents the scheme as a revolving fund, the fact that it will be unable to sell the paddy at the prices paid to farmers, combined with high storage costs and massive leakage, will cause its rapid depletion.

Apart from its high budgetary cost, the structural effects of this scheme are also likely to be negative. By diverting rice from the market, it drives up local prices, with a negative impact on the many poor consumers. It has been estimated that less than a fifth of the subsidy reaches poor farmers. The rest helps millers and large farmers who have surplus rice production. The stockpiles of paddy and rice stored reached an unsustainably high level of 12.5 million tonnes as of May 2012 (more than annual exports), leading to high storage costs and losses and, in the medium term, creating a risk that paddy and rice prices will collapse once the government can no longer sustain its rice mortgage scheme. Thai rice exports are negatively impacted, with exporters becoming dependent on government subsidies to be able to offer competitive prices. The scheme is creating perverse incentives for rice milling, storage and financing system, and a situation that could be difficult to correct in the future. If the Thai rice mortgage model provides any lessons, it is on what practices can best be avoided.

Improve efficiency and effectiveness of public investments

In terms of improving efficient use of budgetary funds allocated to agriculture, the analysis suggests that there is a need for a more balanced approach to allocating scarce public resources among investments in extension activities, technology development and transfer (including good seed) and irrigation. The simulations performed show that, while irrigation investments are an important component of a comprehensive investment package, the highest incremental production volumes and returns on public spending come from best practice extension packages. The key component to this investment package is availability of good quality R3 seed, along with functioning extension and access to fertilizer.

Our analysis shows that geographical targeting of additional limited resources beyond the current levels of public spending on areas of comparative and competitive advantages may be needed to achieve rice production targets. The simulation analysis shows that such targets could be achieved by targeting a core area of 200 000 ha (and about 110 000–120 000 farmers) in the seven plains. These targets could be achieved with a public funding allocation (from both PIP and donors) of about USD 100 million over a three to five year period, of which at least 30 percent would go to extension and technology transfer (including seed production) and the rest to irrigation development.

The simulation analysis shows that the largest incremental production comes from Type B farmers. There are two reasons for this. First, Type B farmers are the largest segment of farmers in the seven plains and this makes their targeting relatively simple. Second, our analysis of farm models shows that they have the potential to generate the largest production increment compared with that of other types of farmers.

Sustained and enhanced rice productivity requires appropriate research and technology development in seed production and management systems, understanding and development of technologies that address yield-limiting and reducing factors in rice production systems, and farm mechanization and reduction of post-production losses. These efforts need to be underpinned by focused and sustained capacity-building programmes.

A basic need for the enhancement and sustenance of rice production is the development, testing and adoption of high-yielding and high-quality rice varieties for the major rice ecosystems of the Lao PDR.

This involves the breeding of new elite rice lines with higher-yield potential, good milling and eating quality, and tolerance to biotic and abiotic stresses in the various rice ecosystems.

The Lao PDR, with more than 13 000 accessions deposited in its gene bank and in the International Rice Gene Bank, has a wealth of rice germplasm. These collected materials have scarcely been studied and characterized. Genetic analyses of these materials will aid in the identification of distinct rice varieties and novel traits that may have a use for the multiplicity of environments in the Lao PDR and the neighbouring countries. This work would be invaluable for *in situ* conservation and utilization of rice within distinct biophysical and cultural environments.

For farmers and seed production enterprises to take advantage of existing and new rice varieties with novel useful traits, systematic evaluation, testing and release procedures need to be in place. There is a need to continue to produce and widely distribute new and better rice seeds and to reach the greatest number of farmers at a time when they need seed. Support for public sector seed production to meet the needs of farmers throughout Lao PDR would need to be supplemented by strong private sector investments. This would require effort directed towards the development, piloting and adoption of strategies, and public policy support for sustainable and viable public-private partnerships.

The seed sector in the Lao PDR, however, faces significant challenges. Addressing these challenges requires allocation of dedicated government funding for seed multiplication, as well as necessary institutional reforms which improve the efficiency of seed production systems at all levels and encourage establishment of a viable private sector-driven seed distribution system. Essential to the regulation of seed production enterprises is the development of seed and grain quality standards, and the formulation of policies and guidelines for seed certification.

Training the next generation of rice scientists and agricultural extension practitioners should be given high priority. To enable and enhance the effectiveness of trained and skilled human resources, appropriate institutional structures, hardware and software tools need to be developed, supported and made available to attain national food security, poverty alleviation and economic growth. Extension support

is limited by the current capacity of NAFES in terms of number of staff, their training and, most importantly, the inappropriate (low) incentive structure. In order to scale up extension investments, innovative approaches should be contemplated, including the use of non-governmental service providers.

Establish the foundation for the development of the rice seed sector

Measures targeting the rice seed sector are designed to improve the effectiveness of public spending as discussed above and in Annex 5. There are a number of specific recommendations to be made as a result of the present study, namely: (i) carry out an institutional review; (ii) clarify institutional responsibilities for seed production; (iii) target public funds for a core volume of seed production; and (iv) support private sector involvement.

First, a rigorous institutional review of seed production systems should be conducted to identify areas for reorganization. This would involve at minimum the following steps: i) identify options for improved planning and coordination of the work between DoA, NAFRI, and NAFES; ii) review and rationalize the strategic role of various seed production stations based on their location, comparative advantage and cost of production, with the aim of maximizing capacity utilization and improving the efficiency of the use of public funds; and iii) identify options for private sector involvement (both domestic and foreign) in Lao rice seed production.

Second, it is important to clarify the institutional mandates of agencies involved in seed production and quality control systems and establish institutional arrangements for effective coordination and exchange of information. Annex 5 presents the proposed institutional mandates and responsibilities for primary public agencies involved in rice seed production. The first step should be the establishment of a national seed board (NSB), and related secretariat (which would not be a statutory body). The NSB could be located within the Department of Planning of MAF. The objective of the NSB would be to have a single coordination unit to meet the government's strategic rice sector development objectives and targets.

Third, there is a need to provide designated public funding for the production of a core volume of seed, which would be determined based on strategic targets for national food security and rice exports. It is suggested that the government allocate annual funding for core

seed production (BS, R1, R2) at a target level of about 300–350 tonnes (depending on the multiplication factor) by 2015, which would allow enough R3 seed for at least 175 000 ha of lowland paddy rice area. This would put the Lao seed renewal rate closer to the level of the Lao PDR's neighbours.

Finally, it is recommended that support and encouragement be given to the development of private seed distribution systems for the sale of R3 seed that is being produced by seed stations and farmer groups. This could involve on a pilot basis the privatization of some seed stations, which would then develop seed distribution through the networks of wholesale and retail agents.

Improve knowledge on food security and agriculture

The analysis in this study encountered significant problems with the data collected for the purposes of estimating per capita rice consumption and other variables useful for tracking food security in the Lao PDR, as well as estimating other agricultural trends. These problems were due to issues of LECS design (questionnaire) as well as implementation. In addition, decentralized reporting systems for areas and production could also be improved, as has been shown by the results of the recent agriculture census, which displayed important differences in estimates. It is, therefore, recommended that support be given to an improved agricultural and nutritional module in the LECS and to ensure efficient implementation of the survey. Finally, there is a need to review the methodology and structure for reporting production and area size by district and provincial government officials, and to include other variables such as farmgate prices.

Annex 1
Issues with the Measurement of Lao Rice Consumption

Data Disorder

Confusion over per capita rice consumption in the Lao PDR is illustrated in TABLE A1.1: it shows some of the different existing estimates according to source and computes an equivalent measure of per capita rice consumption in terms of raw milled rice. A review of various publications focusing on rice consumption in the Lao PDR identified two key sources of data that are usually mentioned in one form or another: (i) Laos Expenditure and Consumption Survey (LECS) data; and (ii) FAOSTAT data. The data from these sources are fundamentally different: LECS data are based on a nationally representative household survey that has been conducted four times (latest in 2007/08), while FAOSTAT data are residual estimates derived from MAF production data (as reported by MAF provincial staff), estimates of exports, imports, change in stocks and rice uses (other than food)[58]. FAOSTAT data are, therefore, not derived from direct measurement through a survey. The estimates on rice uses are a fixed percentage of production as per technical considerations: most importantly they are not directly measured.

In its rice supply and demand balance calculations, the Food and Agriculture Organization/World Food Programme (WFP) Crop and Food Security Assessment (2011) uses "the rice consumption norm of 206 kg of milled rice per capita/year used by MAF's Centre for Statistic and Information (DOS)" and mentions that it is consistent with information from LECS 4. TABLE A1.1 also excludes WFP's Comprehensive Food Security and Vulnerability Analysis (2007) which quotes data from LECS 3 for the per capita requirement of rice (575 g/day) and also mentions that "the average calorie content of different types of rice would result in a per capita requirement of 592 g/person/day". Numerous other studies seem to assume a value for household consumption needs: for example, the NURiFaR Project[59] (2011) indicates that "annual consumption needs per household were

58 All these estimates are used to generate a food availability estimate (which is the consumption equivalent).

59 Northern Uplands Rice-based Farming Systems Project (NURiFaR) is a project implemented by NAFRI with financial support from the Swiss Agency for Development and Cooperation.

calculated on the basis of an annual consumption per adult of 350 kg of unmilled rice. Children from 01 to 10 years old were counted as consuming half that amount. New born children less than 1 year were counted as not consuming rice."

The main reasons identified for the significant differences in the figures quoted on per capita rice consumption are the various interpretations of MAF rice consumption data and the different units of measurement used to weigh rice consumed. Regarding the definition of rice consumption, confusion arises because some studies take the rice consumption estimates of MAF to mean the rice eaten by household members as human food. However, the MAF assumption of around 206 kg/year of raw milled rice per capita includes all the uses of rice, i.e. losses, feed, seed, household storage and other uses (i.e. gifts for religious purposes, animal feed, etc.). Such alternative uses can be quite significant. For example, FAO and WFP (2011) report that MAF estimates these to be 14 percent of production, which would mean that the actual MAF estimate of rice consumption as food would be around 177 kg per capita of raw milled rice. Moreover, data collected as part of the Nam Theun 2 Hydroelectric Project, Food Consumption Monitoring Program (Krahn, 2010) suggests that rice given to dogs could amount to 350 g of cooked rice per day in some instances. While there is uncertainty as to the exact amount of rice used for other than human food, the incorrect interpretation of consumption leads to an overestimation of rice consumption as human food, if other non-consumptive uses of rice are already taken into account in rice balance sheet (surplus) calculations.

Confusion also arises due to the different units of measurement used, which leads to incorrect citations. For example, most of the LECS data quoted in the papers reviewed come from the LECS report that focuses on data from its nutrition module (which collects data on rice balls consumed – more on the topic below). According to the LECS report, data from the nutrition module is based on cooked rice, whose content is around 60 percent water. These data, which result in an annual per capita rice consumption of raw milled rice of less than 130 kg (TABLE A1.1), have been quoted incorrectly in several documents as raw and not cooked rice, as indicated in the LECS report. This results in a significant overestimation of rice consumption.

TABLE A1.1.
Per capita rice consumption (estimates) (kg/year raw milled rice)

Source	Consumption (raw milled rice, kg/capita/year)	Year	Original data	Comment
Main data source				
FAOSTAT[a]	Range from 162 kg to 167 kg	1990–2007	Derived from production data and estimates of import, exports, change in stocks, uses for feed, seed, etc.	Calculation per capita using FAOSTAT milled rice food supply and population estimates from WB Health Nutrition and Population Statistics.
LECS 2, 3 and 4	128 kg 125 kg 129 kg	1997/98, 2002/03 2007/08	Number of cooked rice balls from survey's nutrition module and assuming 100 g per ball.	Cooked rice translated into raw rice using 60% conversion factor for water content.
LECS 3 and 4	145 kg 179 kg	2002/03 2007/08	Based on data from household expenditure diaries on raw rice purchased and produced by household.	
Additional micro studies				
USAID-WCS[b]	112 kg	2009	307 g/day/person of non-glutinous rice and 31 g of glutinous rice.	In-depth analysis of consumption but sampled only 2 families in very specific National Protected Area.
NT2HP-FCMP[c]	178 kg	September 2009 to May 2010	587 g per adult equivalent (AE)/ day; milled raw rice (based on measured use for feed of around 18 g per capita).	Sample of 100 households in Central Lao PDR followed for nine months. Data is entered in a consumption diary for a 14-day period. AE uses a 0.83 conversion factor.

[a]FAOSTAT data are also used in IRRI's Rice Almanac publications (IRRI, 1997 and IRRI, 2002) and are described in more detail below.
[b]The Wildlife Conservation Society and USAID TransLinks Program (Johnson, Krahn and Seateun, 2010).
[c]Nam Theun 2 Hydroelectric Project – Food Consumption Monitoring Program (2010).

LECS Data

LECS includes two very different types of information on rice consumption, namely: (i) data from the nutrition module that measures rice balls eaten by households at breakfast, lunch and dinner; and (ii) data from household transaction diaries, which collected expenditures in value (Kip) and quantity of rice by household with details on the type of transaction (expenditure in cash or kind, or consumption of food produced by household). Both types of data are disaggregated by glutinous and non-glutinous rice and present various challenges in terms of interpretation.

Data on rice balls consumed are, according to the LECS 3 report, based on cooked rice. While in principle these data could be very accurate, the quality of the data on rice balls depends critically on the conversion of balls into kilograms, which has been calculated at 100 g per ball in the LECS reports. There can be, in principle, diversity in the weight of rice balls, depending on each household's cooking habits and utensils. It is, however, not clear whether the potential diversity in weight has been correctly addressed and whether using the current estimate from the LECS nutrition module would result in figures at the low end of the ranges reported for Lao per capita rice consumption.

The data from the household transaction diaries may be more reliable in terms of units (enumerators report on unit of quantity for each transaction). However, they do not refer to rice consumption directly but rather to expenditure on rice, which may include expenditure by households for a stock of rice for future use, or even purchases for small-scale trading purposes. This would to some extent be offset by the fact that the household sample is distributed over a full calendar year. Using these data, the average per capita rice consumption in the Lao PDR would be closer to that of other countries in the region and also to the FAOSTAT estimates. However, the data would also show a significant increase in consumption between LECS 3 and 4 from 145 kg to 179 kg (TABLE 2). This increase seems to result mostly from growth in consumption in rural areas, which may indicate (or be due to) relatively rapid annual growth in rice production during the period 2003–2008 (4.4 percent per annum) compared with the average growth rate of 2.8 percent per annum between 2001 and 2010.

Annex 2
Producer Support Estimate Methodology in Brief

The producer support estimate (PSE) has officially been calculated by the OECD for various countries since 1987. It serves as an instrument for estimating the level of domestic support to agriculture and for comparing it with other levels of support internationally. The PSE consists of two components: (i) market price support (MPS) which is measured as the gap between domestic and reference prices; and (ii) budget transfers (BTs).

A positive PSE means that farmers are the beneficiaries of the government policy providing support to agriculture in that they receive subsidy transfers. This may indicate various market distortions arising from trade restrictions and income transfer programmes. A negative PSE (MPS) means that producers may be implicitly taxed as a result of agricultural policy decisions which favor consumers and/or market distortions. Generally, PSEs in high income countries tend to be highly positive, indicating trade protection and income transfers (i.e. price supports, input subsidies, etc.) from taxpayers to producers. Highly positive PSEs also indicate the relatively strong political influence of well-organized producer groups. PSEs are more variable in low income countries than in high income countries, depending on specific government policies and the relative influence of farm groups in politics. PSEs are often used in multilateral and bilateral trade negotiations to determine the relative protection offered to producers, which may give them a competitive advantage over their trade partners. A negative PSE is generally not a concern in trade negotiations as it indicates that government is voluntarily reducing the competitiveness of its producers compared with that of the producers of its trade partners.

A list of OECD definitions used in PSE, consumer support estimate (CSE) and total support estimate (TSE) is presented in Box A2.1.

BOX A2.1
Definitions used in producer support estimate, consumer support estimate and total support estimate

Producer support estimate – PSE: the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farmgate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income.

Percentage PSE (PSE%) – PSE as a share of gross farm receipts.

General services support estimate – GSSE: the annual monetary value of gross transfers to general services provided to agricultural producers collectively (such as research, development, training, inspection, marketing and promotion), arising from policy measures that support agriculture regardless of their nature, objectives and impacts on farm production, income, or consumption. The GSSE does not include any transfers to individual producers.

Consumer support estimate – CSE: the annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farmgate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on consumption of farm products.

Percentage CSE (CSE%) – CSE: CSE as a share of consumption expenditure (measured at farmgate) net of taxpayer transfers to consumers.

Total support estimate – TSE: the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products.

Percentage TSE (TSE%) – TSE as a share of the GDP.

Source: Organisation for Economic Co-operation and Development, 2010.

The nominal protection rate (NPR) coefficient is the coefficient of support to agricultural producers measured as the difference between the value of output in domestic producers (farmgate) prices and in reference (border) prices, expressed as a percentage.

The reference price is the price that domestic producers could have received for their production in the absence of any domestic or trade policy affecting this commodity's market. Border prices of imports or exports are often used as reference prices. Another option is to use specific border prices in close neighbouring countries or in the countries playing a major role in international trade of the commodity, or stock exchange prices.

Reference price and producer's price for MPS calculations must be measured at the same level of processing and at the same market. Therefore, reference prices (border prices) must be adjusted for marketing margins in order to become comparable with farmgate producer prices. The adjustment is made for the costs of processing, handling and transportation to the market where the domestically produced commodity meets the commodity from the foreign market.

Rice producer support estimate

Budget transfers (BTs) for calculating coefficients of support estimation can exist in the form of transfers to producers, financing of general services or transfers to consumers. Thus, all budget transfers need to be distinguished between the PSE, the CSE and the GSSE. Detailed analysis and deep understanding of the nature of the policy measures is needed for correctly distinguishing budget support.

Only budget funds benefiting the agricultural sector and not other sectors are included in calculations. Not only MAF expenses but also public expenses of any other entity or ministry are included if they are benefiting agriculture.

Transfers to agricultural producers, where individual farmers or groups of farmers are the beneficiaries, must be included in the PSE, and when the agricultural sector as a whole, not at the level of individual farmers, benefits from the transfer, it is included in the GSSE[60].

Transfers to first consumers of agricultural production (agroprocessors) and food aid programmes are included in CSE. However, as primary agriculture is often the final beneficiary of the subsidies to agroprocessing sector, these subsidies can be included in the PSE. The reason for attributing those transfers to the PSE or the CSE will be discussed below separately for each transfer.

Transfers in the PSE are presented as a matrix structure whereby PSE categories are presented along the vertical axis and PSE labels along the horizontal axis. Categories and labels indicate the way the policy programme is implemented. The classification of BTs is given in FIGURE 36.

Categories indicate the base on which the transfer or subsidy is calculated, such as value of production, number of animals, input use, services provided, income or non-commodity criteria. Categories

60 Organisation for Economic Co-operation and Development, 2010.

also indicate whether the current or historical level of production is used. Labels are used for each category and allow a more detailed understanding of each policy measure implementation.

Other parameters for computing the PSEs for the rice sector from 2005 to 2011:

- All price data and inflation are adjusted to the same calendar, i.e. the Lao fiscal year (October 1 to September 30).
- While we do not compute GSSE, it is fairly limited given the country's resources allotted to research and development, as well as general extension activities (besides rice targeted extension).

Annex 3
Econometric Analysis of Price Transmission

Glutinous Rice (retail) in the Lao PDR and Glutinous Paddy in Thailand

This section briefly describes the econometric price transmission analysis for glutinous rice (retail) in the Lao PDR and glutinous paddy in Thailand.

Tests for co-integration and symmetry of price transmission
Data period: January 1990–December 2011

The tests for co-integration and symmetry of price transmission were carried out, as displayed in TABLE A3.1.

TABLE A3.1
Co-integration test results for glutinous rice (retail) in the Lao PDR and glutinous paddy in Thailand

			Co-integrated?		Error Correction Model				Asymmetry of adjustment	
	Unit root? (5%) level		Johansen Test (5%)		Speed of adjustment**		Short-run adjustment		Positive/negative***	
	PP*	ADF*	Lao PDR	Thailand	Lao PDR	Thailand	Lao PDR	Thailand	Lao PDR	Thailand
Lao PDR	Yes	Yes	–	Yes	–	**-0.078**	–	d(0.08) ld(0.01)	–	-0.07 **/-0.08**
Thailand	Yes	Yes	Yes	–	**-0.075**	–	d(0.07) ld(0.05)	–	**–0.09/**0.02	–

*Phillips-Perron and Augmented Dickey-Fuller Tests.
**Transmission is from row to column.
***"Positive" is when ϵ_t in $y_t = \alpha_0 + \alpha_1 x_t + \epsilon_t$ is positive and "negative" is when ϵ_t is negative.

The Lao and Thai price series are I(1). The series are co-integrated. However, the transmission coefficient is relatively low (-0.075 and -0.078), which could indicate that most of the transmission is instantaneous (i.e. happens within a month; see below for contemporaneous effects).

Granger Causality Test

The Granger Causality Test indicates that current values of a variable can be explained by past values of another variable.

The Granger Causality Test makes use of the following specification:

$$y_t = \alpha_o + \sum_{i=1}^{p} \sigma_i y_{t-i} + \epsilon_t$$

$$y_t = \alpha_o + \sum_{i=1}^{p} \sigma_i y_{t-i} + \sum_{i=1}^{q} \varphi_i x_{t-i} + u_t$$

The variable χ represents other factors that may Granger cause y. ϵ_t and u_t are white noise residuals. The null hypothesis of the Granger Causality test indicates that:

$$\varphi_1 = \varphi_2 = \cdots = \varphi_q = 0$$

Therefore, failing to reject the null in the Granger Causality Test implies that χ does not Granger cause γ (Granger, 1969).

After testing for proper lag length, a Granger Causality Test was carried out, as displayed in TABLE A3.2.

TABLE A3.2
Granger Causality Test for glutinous rice (retail) in the Lao PDR and glutinous paddy in Thailand, January 1990–December 2011

Period	Direction of causality	Chi²	p-value
January 1990–December 2011	**Thai → Lao***	**6.900**	**0.035**
	Lao → Thai	4.052	0.132

*Bold = significance at 5 percent.

The Granger Causality Test indicates that lagged movements in farm Thai glutinous price explain (cause) the current value of Lao retail glutinous rice, but the reverse is not true. This is consistent with the fact that Thai glutinous production is much larger than Lao glutinous production.

Contemporaneous effects

Regression of the Lao retail price on the Thai farmgate paddy price yielded that the two series have contemporaneous effects on each other (as per TABLE A3.3).

$$y_t = \alpha_0 + \alpha_1 x_t + \epsilon_t$$

TABLE A3.3
Regression analysis for glutinous rice (retail) in the Lao PDR and glutinous paddy in Thailand, January 1990–December 2011

	γ_t/χ_t	α_1	Ajd R^2	t-statistics	p-value
January 1990–December 2011	Lao/Thai	0.54	0.36	12.3	0.000

Glutinous and Ordinary Rice (retail) in the Lao PDR

This section briefly describes the econometric price transmission analysis for the glutinous and ordinary rice markets in the Lao PDR.

Tests for co-integration and symmetry of price transmission

Data: January 1990–December 2011

The tests for co-integration and symmetry of price transmission were carried out, as displayed in TABLE A3.4.

TABLE A3.4
Co-integration test results for glutinous and ordinary rice (retail) in the Lao PDR, January 1990–December 2011

			Co-integrated?		Error Correction Model				Asymmetry of adjustment	
	Unit root? (5%) level		Johansen test (5%)		Speed of adjustment**		Short-run adjustment		Positive/ negative***	
	PP*	ADF*	Glutinous	Ordinary	Glutinous	Ordinary	Glutinous	Ordinary	Glutinous	Ordinary
Glutinous	Yes	Yes	–	Yes	–	**-0.08**	–	**d(0.47)** ld(0.02)	–	-0.04 **/-0.13**
Ordinary	Yes	Yes	Yes	–	**-0.06**	–	**d(0.24)** ld(0.06)	–	**-0.09/**-0.02	–

*Phillips-Perron and Augmented Dickey-Fuller test.

**Transmission is from row to column.

***"Positive" is when ϵ_t in $y_t = \alpha_0 + \alpha_1 x_t + \epsilon_t$ is positive and "negative" is when ϵ_t is negative.

Both series are I(1), and they are co-integrated.

Granger Causality Test

The null hypothesis of the Granger Causality Test is that coefficients of the lagged values of the explanatory variable are equal to zero. In the case of transmission from ordinary to glutinous rice, we fail to reject the null hypothesis (with p-value 0.257). Therefore, the lagged values of ordinary rice do not explain the current values of glutinous. In the reverse case, however, we reject the null hypothesis (p-value = 0.011). Hence, glutinous rice prices Granger cause ordinary rice prices. Thus, the causality tests indicate that transmission is mostly from the glutinous to the ordinary rice market and not the reverse (TABLE A3.5). This is consistent with the fact that glutinous rice production is much larger than ordinary rice production.

TABLE A3.5
Granger Causality Test results for glutinous and ordinary rice (retail) in the Lao PDR, January 1990–December 2011

	Direction of causality	Chi^2	p-value
January 1990–December 2011	**glu → ord**	**8.962**	**0.011**
	ord → glu	2.716	0.257

Bold = significant at 5 percent.

Contemporaneous effect

The two variables are correlated (0.75), and contemporaneously affect each other. Regressing the two variables on the current values of each other yielded the following results:

$$y_t = \alpha_0 + \alpha_1 x_t + \epsilon_t$$

y_t = glutinous rice price

x_t = ordinary rice price

α_1 = 0.81 Adjusted R^2 = 0.55 t-statistic = 18.12 p-value = 0.000

y_t = ordinary rice price

x_t = glutinous rice price

α_1 = 0.69 Adjusted R^2 = 0.55 t-statistics =18.12 p-value = 0.000

Thus, the two series have contemporaneous effect on each other.

Annex 4
Proposed Design of a Variable Rice Export Tax

The indicative variable export tax schedule shown in Chapter 4 was designed as follows. First, a target external price (farmgate prices for glutinous paddy in Thailand) for 2012 was selected as the average inflation-adjusted price over 2009, 2010 and 2011 (converted to Lao Kip per kilogram using the prevailing exchange rate) multiplied by an inflation adjustment to account for likely inflation in 2012. This target external price (expressed in Kip per kilogram) gives some idea of what external prices are likely to be in 2012. Alternatively, the government could specify a different price, but that price should consider the level of prices in Thailand given the integration of the Lao PDR into regional markets as described earlier.

Second, a schedule for the export tax was selected. The schedule described below is reasonable but arbitrary – the actual schedule would need to be decided by government authorities in consultation with stakeholders. The schedule states that if prices exceed the target price by less than 20 percent, then no export tax is imposed. After that, as external prices progressively increase, a larger share of the incremental increase in prices is taxed – first 20 percent of the increment, then 40 percent, then 60 percent, then 80 percent, and eventually 100 percent if the external price is double the target price. Note that these tax rates are marginal tax rates – they do not apply to the entire price, but only to that portion of the price that is above the various thresholds as defined in TABLE A4.1. Designing the schedule in this way ensures that the tax gets progressively larger as the external price increases – this is necessary in order to dampen the peak price spikes.

Note that the export tax described below lowers the average price received by farmers (because the export tax is always positive or zero). If it is desirable to keep the average price with a variable export tax equal to the average price without such a tax, then an export subsidy would need to be implemented in years of low external prices.

TABLE A4.1
A sample progressive export tax

If $P \leq 1.2*PTARGET$, $T = 0$.

If $P > 1.2*PTARGET$ but $P \leq 1.4*PTARGET$, $T = 0.2*(P - 1.2*PTARGET)$.

If $P > 1.4*PTARGET$ but $P \leq 1.6*PTARGET$, $T = 0.2*(1.4*PTARGET - 1.2*PTARGET) + 0.4*(P - 1.4*PTARGET)$.

If $P > 1.6*PTARGET$ but $P \leq 1.8*PTARGET$, $T = 0.2*(1.4*PTARGET - 1.2*PTARGET) + 0.4*(1.6*PTARGET - 1.4*PTARGET) + 0.6*(P - 1.6*PTARGET)$.

If $P > 1.8*PTARGET$ but $P \leq 2.0*PTARGET$, $T = 0.2*(1.4*PTARGET - 1.2*PTARGET) + 0.4*(1.6*PTARGET - 1.4*PTARGET) + 0.6*(1.8*PTARGET - 1.6*PTARGET) + 0.8*(P - 1.8*PTARGET)$.

If $P > 2.0*PTARGET$, $T = 0.2*(1.4*PTARGET - 1.2*PTARGET) + 0.4*(1.6*PTARGET - 1.4*PTARGET) + 0.6*(1.8*PTARGET - 1.6*PTARGET) + 0.8*(2.0*PTARGET - 1.8*PTARGET) + 1.0*(P - 2.0*PTARGET)$

Annex 5
Seed Sector Analysis

In order to maintain and build on the benefits of high adoption rates of improved varieties, the purity or quality of the planting seed must be maintained over time. In the Lao PDR, R3 seed is not widely used and planting seed is being used well in excess of the recommended three to four seasons before the seed stock is replenished. The use and availability of quality R3 planting seed inputs remains a significant constraint to improved rice productivity.

The recent survey of seed production in the Lao PDR shows that the total national production of R3 seed in all provinces was about 6 700 mt during the 2010/11 dry season and the 2011 wet season[61] (TABLE A5.1). Provided that at least three-quarters of this seed met minimum quality standards, the total production of R3 seed may have reached about 5 000 mt, which is more than ten times the seed production levels in the early 2000s . This would be enough to provide seed replacement for about 62 000 ha of lowland rice paddy land. Assuming that farmers use 80 kg of R3 per ha, this would give a potential seed renewal rate (SRR) in lowland paddy areas of about 6 percent when using the latest figures from the 2010–2011 Lao Agriculture Census[62].

The SRR is a useful indicator to measure the degree of seed replacement. It is calculated as area used for R3 or equivalent seed divided by total sowed area. Low SRRs indicate low yields and quality of rice production systems. The SRR increases with the degree of commercialization of the rice sector, such as increasing exports, as farmers start using more new and improved seed. It has been estimated that Thailand and Viet Nam, which are the world's number one and number two rice exporters, respectively, have a SRR of about 20 percent[63].

61 Lao Uplands Food Security Improvement Project (LUFSIP) seed production survey (February–April 2012).

62 It should be noted that a SRR of 6 percent is a purely theoretical estimate. The actual SRR in the Lao PDR is significantly lower, probably in the area of 2–3 percent, as a significant share of R3 seed production is consumed by farm households as paddy, rather than used as seed. The data from the Rice Productivity Improvement Project (RPIP) show that farmers sell or exchange with their neighbours only about 15–20 percent of their R3 production, with the rest being used for their own sowing (small amount) and consumed or sold as paddy due to low seed prices (or the lack of willingness to pay higher prices).

63 Dr Katsumi Katayama, personal communication.

TABLE A5.1 **Summary of rice seed production by province**

		BS (MT)			R1 (MT)			R2 (MT)			R3 (MT)		
Province	Center	DS 2010/11	WS2011	Total	DS 2010/11	WS2011	Total	DS 2010/11	WS2011	Total	DS 2010/11	WS2011	Total
Vientiane Capital	RCCRC	0.3	0.3	0.6	21.3	6.5	27.8	80.0	57.2	137.2	0.0	0.0	0.0
	PPC	0.0	0.0	0.0	0.0	0.0	0.0	25.0	35.0	60.0	0.0	0.0	0.0
	Nongheo SMS	0.0	0.0	0.0	0.0	0.0	0.0	20.0	19.0	39.0	150.0	120.0	270.0
Phongsaly	None	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Luangnamtha	LAFRC	0.04	0.2	0.2	0.6	2.6	3.2	6.6	7.7	14.3	2.7	17.8	20.5
Oudomxay	None	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bokeo	None	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Luangphabang	NAFReC	0.0	0.8	0.8	0.0	2.5	2.5	0.0	0.0	0.0	0.0	10.0	10.0
Huaphanh	None	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	23.0
Xayabuly	30 ha TSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	28.0	35.0	63.0
Xiengkhuang	None	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0	17.0
Vientiane	Pakcheng	0.0	0.0	0.0	6.4	3.0	9.4	15.0	16.0	31.0	157.7	200.0	357.7
Bolikhamxay	Thakok Khoun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	60.0
Khammuane	Se Bang Fai	0.0	0.0	0.0	0.0	0.0	0.0	10.8	6.6	17.4	310.0	244.0	554.0
Savannakhet	Thasano	0.2	0.2	0.4	7.0	35.0	42.0	90.0	70.0	160.0	800.0	1,240.0	2,040.0
Salavane	Nong Deng	0.0	0.0	0.0	0.0	0.0	0.0	9.0	40.0	49.0	412.2	885.2	1,297.4
Sekong	Sekong TSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Champasack	SAFReC	0.0	0.0	0.0	3.5	4.0	7.5	73.0	80.0	153.0	826.0	1,121.0	1,947.0
Attapeu	Attapeu TSC	0.0	0.0	0.0	0.0	0.0	0.0	3.0	6.0	9.0	24.0	30.0	54.0
Total		0.5	1.5	2.0	38.8	53.6	92.4	332.4	340.2	672.6	2,770.6	3,943.0	6,713.6

Source: Lao Uplands Food Security Improvement Project (LUFSIP) seed production survey, February–April 2012 (World Bank, 2012b), and Rice Productivity Improvement Project (RPIP) progress reports (World Bank, 2011c).

In order to maintain current levels of 5 000 mt of good quality R3 seed, seed stations in the Lao PDR need to continue to produce about 10 mt of R1 seed and 225 mt of R2 seed annually, assuming a modest multiplication rate of 30 times. Assuming an average production cost at the field level of Kip 14 million plus additional funds for seed conditioning, and an average yield of 2.5 tonnes/ha, funding of about USD 160 000–USD 180 000 would be required annually for seed production to meet the R1 and R2 production requirements at current levels. This cost is in addition to the cost of R3 production through farmers' groups and recurrent expenditures on staff salaries and operating costs of seed centres. It should be noted that currently the vast majority of the R3 seed is multiplied by seed producers' groups under two donor funded projects. There is a risk that seed production could suffer a significant decline in the coming years, unless government is able to allocate sufficient budget resources.

The MAF has set an indicative production target of 60 000 mt of rice seed by 2015. Breeder seed (BS), and R1 and R2 seed must be produced two to three seasons in advance in order to meet the R3 seed requirements. In order to produce 60 000 mt of R3 seed, the seed stations must produce 5.3 mt of good quality BS, 119 mt of R1 seed and 2 685 mt of R2 seed on 24 500 ha of land. Given that the total amount of good quality R3 seed produced in the 2010/11 dry season and the 2011 wet season was estimated at about 5 000 mt, it is unlikely that seed stations will be able to reorganize themselves and marshal the necessary resources to meet the target of 60 000 mt in the remaining four years. Furthermore, using 60 000 mt of R3 seed at a seed use rate of 80 kg per ha would increase the SRR to nearly 93 percent, which seems to be unrealistic when compared with international experience.

To illustrate the complexity involved in the development of seed production, model simulations were run that would caliber the level of R3 seed production by 2015 at a SRR of 20 percent. This is on par with the current level of SRRs in Thailand and Viet Nam. In order to achieve this target, the Lao PDR would need to produce about 14 000 mt of good quality R3 seed, assuming that all seed is used for production rather than for food consumption. This would require an expansion of the area under R3 seed to about 175 000 ha. The seed production requirements to reach this target are presented in TABLE A5.2. Assuming that the use of improved R3 generates an incremental yield increase of 20 percent, the national average yields of lowland paddy

(both wet and dry season) would increase from the current 3.84 mt/ha to 3.95 mt/ha, keeping all other factors constant. The respective incremental increase in paddy production by 2015 would be about 355 000 tonnes, which is about 70 percent of the incremental 0.5 million mt estimated under the baseline scenario, in order to reach the 2015 target of 4.2 million mt.

TABLE A5.2
Simulation run for SRR = 20 percent by 2015

Seed generation	2012	2013	2014	2015
BS (mt)	1.5	1.7	1.8	2.0
R1 (mt)	40	45	50	55
R2 (mt)	450	660	794	818
R3 (mt)	5 000	7 425	10 890	14 000
Approximate (mt)	5 450	8 085	11 684	14 818
BS (ha)	0.6	0.7	0.7	0.8
R1 (ha)	16	18	20	22
R2 (ha)	180	264	318	327
R3 (ha)	2 000	2 970	4 356	5 600
Total area	**2 196**	**23 252**	**4 694**	**5 949**
Wet season lowland (ha)	706 156	720 279	734 685	749 379
Dry season lowland (ha)	108 000	116 100	124 808	134 168
Total lowland rice area (ha)	**814 156**	**836 379**	**859 492**	**883 547**
Area used for R3 or similar seed (80 kg/ha)	62 500	92 813	136 125	174 997
SRR (%)	8	11	16	20
Average yield growth in lowland areas (mt/ha) (assuming 20% yield growth)	3.86	3.89	3.93	3.96
Yield growth rate in lowland areas (%)		0.7	1.0	0.8
Total lowland production (mt)	3 141 978	3 235 725	3 353 360	3 496 602
Incremental lowland production of paddy beyond baseline (mt)		109 159	231 787	354 620

Source: The authors' calculations.

Achieving the 14 000 mt seed production target is in line with current production capacities. In fact, seed stations in the Lao PDR can produce significantly more R3 rice seed than suggested by current production volumes. Given the estimated volume of 92 tonnes of R1 seed which was produced in the 2010/11 dry season and the 2011 wet season, the seed stations should, in theory, be able to produce 2 000 tonnes of R2 seed in year t+1 and about 46 000 tonnes of R3 seed in year t+2, assuming that only 75 percent of R1 seed and R2 seed is of good quality and assuming a conservative multiplication rate of 30 times. In fact, producing 14 000 tonnes of R3 seed can be produced just by two to three seed stations. In reality, the situation is more complex, as seed stations produce a wide range of rice seed varietals which complicates future production planning of sequential generations.

One of the factors that limit full utilization of current seed production capacities is the weak coordination among the various MAF agencies (NAFRI, NAFES, DoA) and provincial-level entities involved in seed production. Lack of coordination has led to limited information exchange between stations/provinces, with each station/province acting seemingly in isolation from one another, rather than supporting implementation of the national seed production goals. It is, therefore, necessary to improve the coordination between NAFRI, NAFES and DoA to ensure that the good seed produced by projects reaches farmers who demand it. There is an opportunity to generate the demand through extension activities, which raise farmer awareness about the benefits of using improved seeds and, thus, increase their willingness to buy these seeds, but to do so would require significant scaling up of extension activities.

There are large geographical differences in per ha seed production costs among stations. The cost of seed production in MAF and provincial seed stations range from Kip 6 million to Kip 13 million per ha depending on the location, some of which offer a greater opportunity to produce more seed with fewer public resources[64]. In addition to varying production costs, the large number of seed stations scattered throughout the country operate at varying degrees of capacity (under) utilization, which also has implications for public spending. The main reason for maintaining such a large number of seed centres and conducting other seed production activities at the provincial level is because a functioning private or public seed distribution system is lacking. Developing such seed distribution

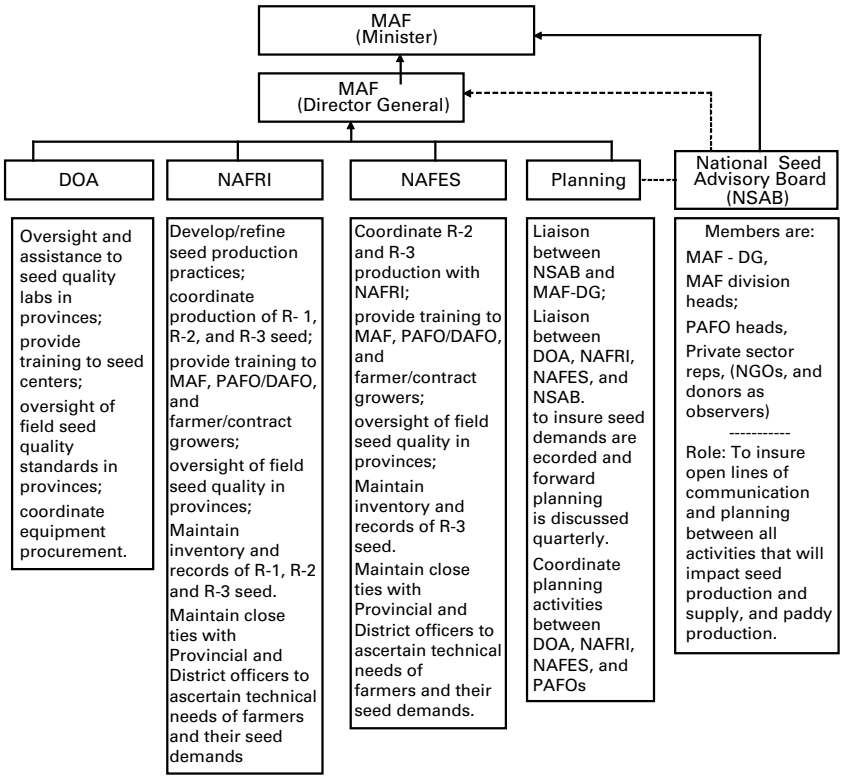
64 World Bank supervision missions of LUFSIP and RPIP from May to November 2011.

systems has the potential to generate significant cost savings of public funds through better capacity utilization and cost efficiency. Input dealers would, in principle, be able to sell farmers quality seed along with fertilizer and agrochemicals, but past efforts to channel seed sales through private input dealers have failed due to the inability of dealers to source consistent quantities and qualities of rice seed from seed producers, as well as from provincial seed stations, which prefer to sell their seed directly to end users.

Appendix A
Proposed Roadmap for the Development of the Rice Seed Sector

Features and Components	I (2011-2015)	II (2016-2020)	III (2021-)
Key strategic actions and targets			
Seed Productivity	Medium in Main Rice Production Areas	High in Main Rice Production Areas	High in All over the country
Main Target Areas	Main Rice Production (7 large plains) Areas	Main Rice Production (7 large plains and 14 small plains) Areas	All Provinces
Target of Each Phase	Small Scale Multiplication and Distribution	Medium Scale Multiplication and Distribution	Large Scale Distribution System
Target Seed Renewal Rate	10 % (Main Rice Production Areas)	33 % (Main Rice Production Areas)	33% (All over the country)
Main Element of R3 Distribution	Small farmer groups and Seed Associations/ Agriculture Cooperative/ private enterpises through input dealers, rice mills, SMC and DAFOs	Small farmer groups and Seed Associations/ Agriculture Cooperative/ private enterpises through input dealers and rice mills	Small farmer groups and Seed Associations/ Agriculture Cooperative/ private enterpises through input dealers and rice mills
Production Plan of R1 & R2/Ordering System of R3	Seed user side base	Ordering System	
Producer	Seed Multiplication Centers (Research Centers etc.)	Seed Multiplication Centers (Research Centers etc.) and selected seed growers from R3 producers	Seed Multiplication Centers (Research Centers etc.) and selected seed growers from R3 producers
Institutional Structures			
Law and Regulation	Basic Seed Law for Main Crops	Regulation for Seed Association etc.	Improvement
Guidelines/Standards	Formulation (Tentative)	Enforcement	Revision
National Seed Board (NSB)	Establishment		
Secretariat of NSB	Establishment		
National Union of Seed Associations/ Corporative/ State Enterprise		Establishment	
Seed Control and Certification System	Preparation period	Enforcement	Evaluation

Appendix B
Proposed Relationships and Suggested Roles of Key Players in the Rice Seed Production System



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